

High Performance DP-2 Self Propelled Self Elevating Installation Vessel



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A 3D rendering of an offshore wind farm under construction. In the foreground, a red and white vessel labeled 'CIMC 3060' is positioned around a wind turbine's foundation. A yellow crane is mounted on the vessel, and a large white turbine nacelle is being lowered into place. The turbine's three blades, with red and white stripes, extend outwards. In the background, a long line of similar wind turbines stretches across the horizon over a calm sea under a clear sky.

Vessel Function Introduction

Overall Scheme Introduction

Model Selection for Major Equipment

Scheme Comparison

Vessel Function Introduction

Customize to Meet with

- Max. working depth: 75m; Max. penetration: 35m;
- Max. working depth plus penetration: 90m;
- Vessel dimension: L/ 125~135m; B/48~55m/; D/~10m
- DP-2
- Speed: 8-10 Knot
- Leg length: 120-125m
- Deck variable load: 7,000t (no diesel or water), Deck area: 5,000m²
- Design life: 30 years; Elevating: 3,000 times (100 time/year)
- Primary crane: 1,600t @28m-31m; 1,200t @40m (lifting height should be 160m above deck)
- Secondary crane: 600t @30m (TBD)
- POB: 130

A 3D rendering of an offshore wind farm under construction. In the foreground, a red and white supply vessel labeled 'CIMC 3060' is positioned near a wind turbine's foundation. A yellow crane is mounted on the vessel, and a large white turbine nacelle is being lowered into place. The background shows a long line of similar wind turbines extending across the sea under a clear blue sky.

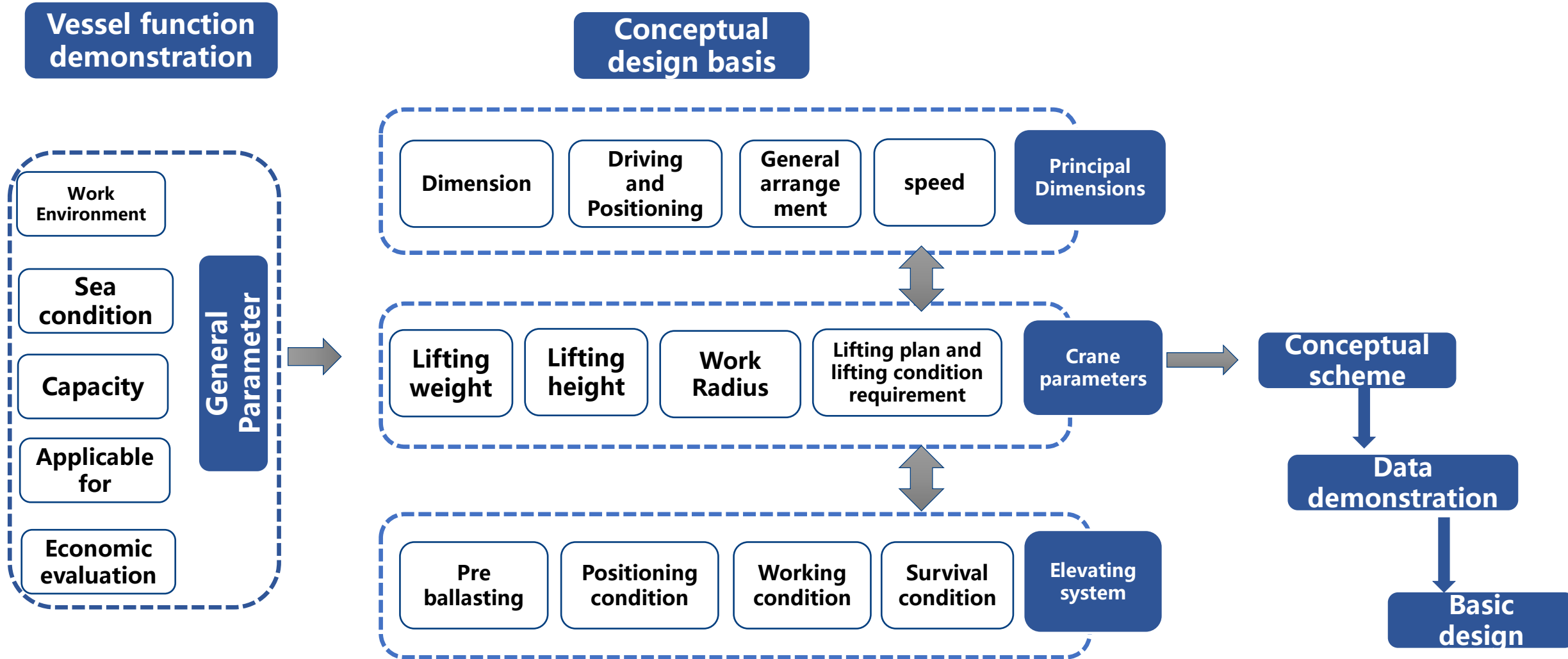
Vessel Function Introduction

**Overall Scheme
Introduction**

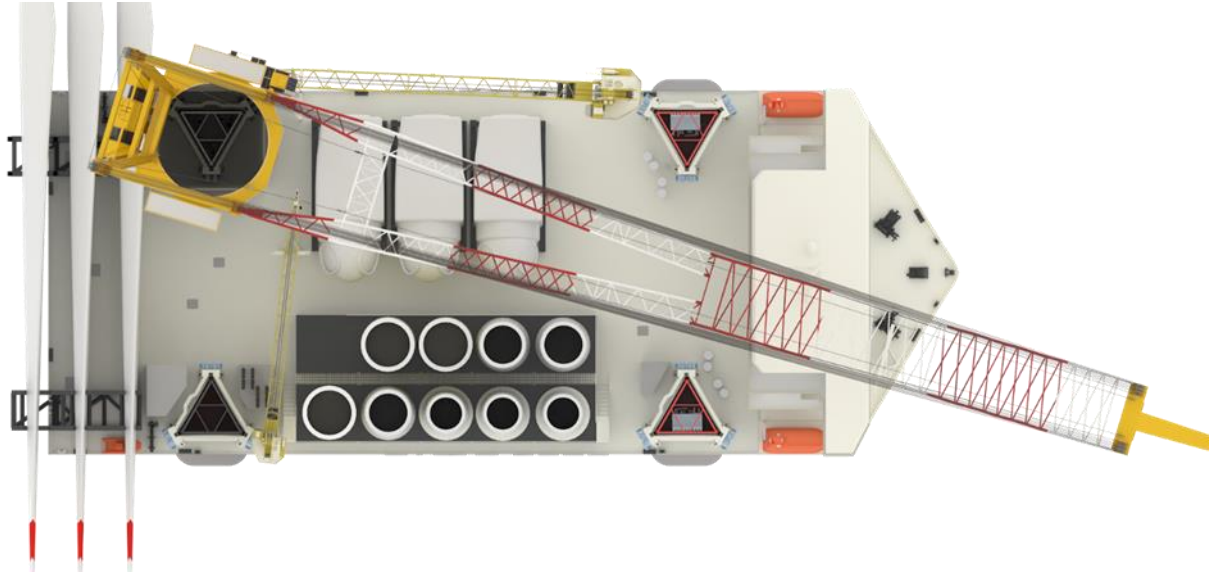
Model Selection for Major Equipment

Scheme Comparison

Overall Scheme Implementation



Overall Scheme Introduction



Designed by.....	CIMC 
EPC Contractor.....	TBD
E&I Package.....	Siemens /ABB/711
Engine.....	Weichai/SXD
Propulsion.....	Suchuan or Client specify
Leg Encircling Crane...	Client specify
Elevating system.....	WMMP

Flag state: China

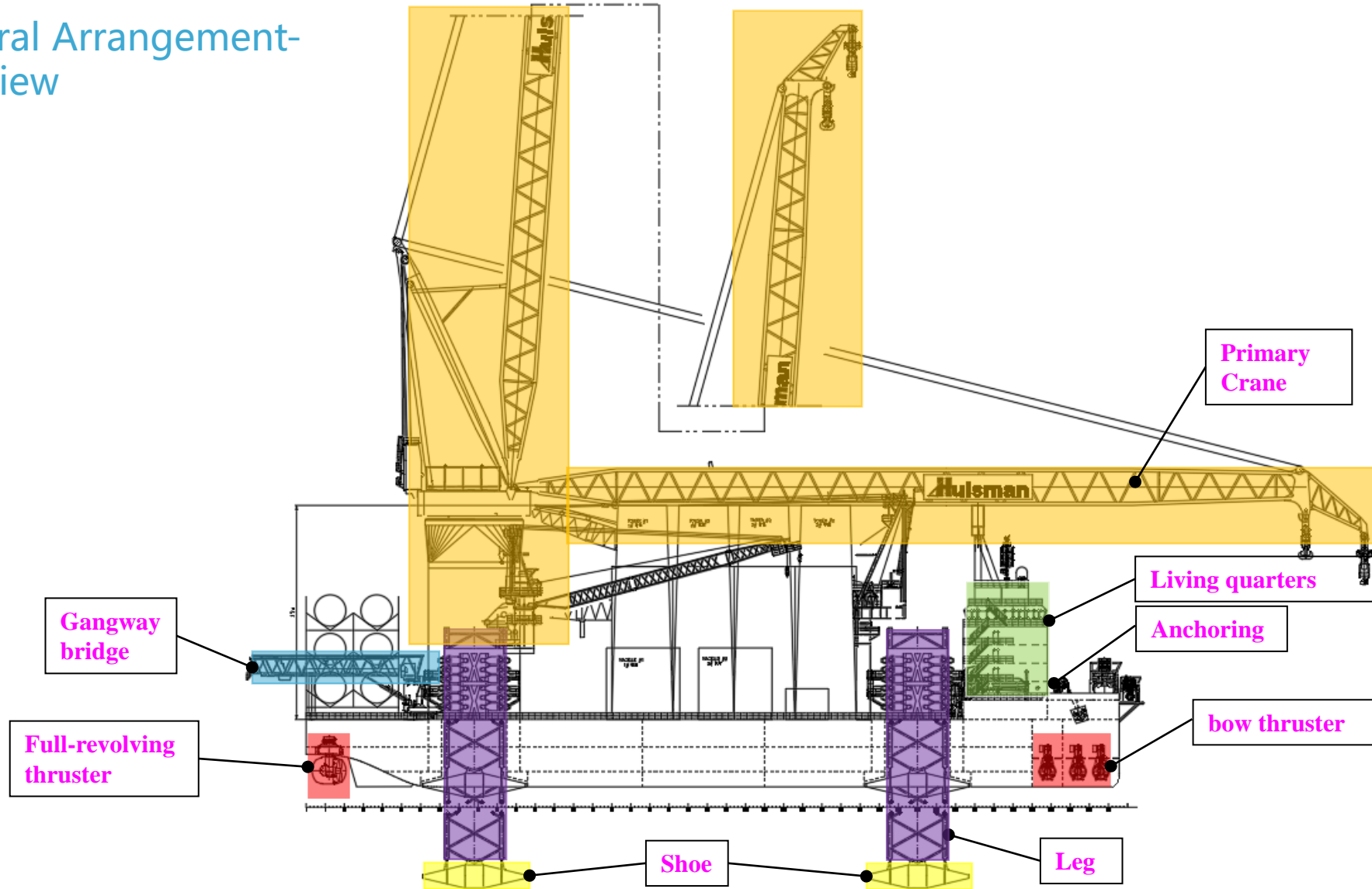
Classification society: CCS

Classification symbol: ★CSA, ★CSM, Self-Elevating Offshore Wind Turbine Service Unit, Lifting Appliance, AUT-0, DPS-2,

Dimension	L 133/ B 53m/ D 11m
Primary Crane	Left stern 2,200t LEC
Deck Area	5,000 m ²
Work in waters	Chinese waters
Max. work depth	70m (11m air gap / 10m penetration)
Leg and length	Truss type / 125 m Available length below deck: 95m
Speed	9 knots
Variable load	9,000 tons/7,500 tons
Elevating system	Pinion-and-rack Speed: 0.5/0.8m/min; Life: 3000 times
Positioning	DP-2
Staff capacity	120 P
Significant wave height	2.5m (positioning condition)
Available for work (the South Sea)	>200 days

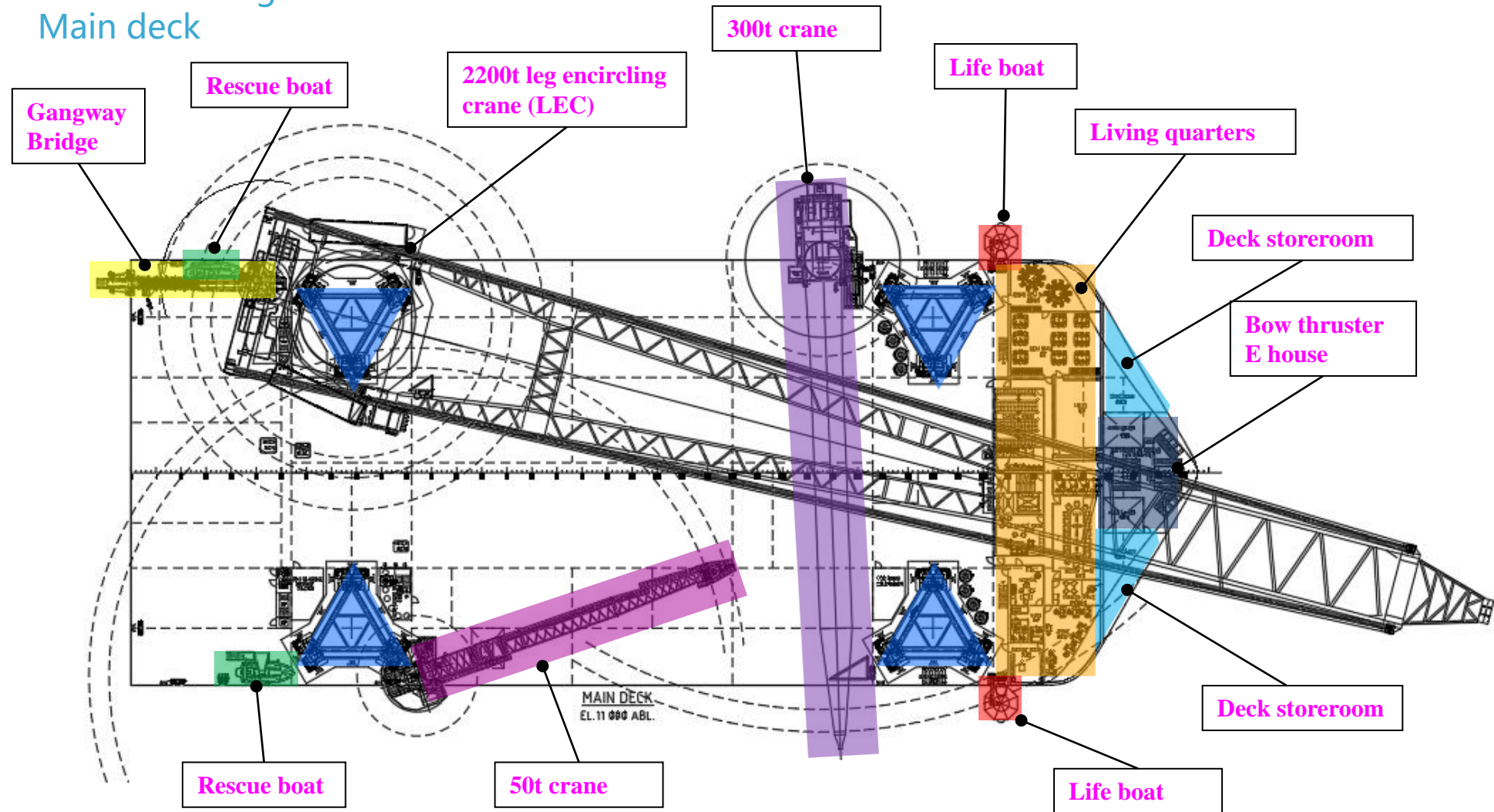
Overall Scheme-General Arrangement

General Arrangement-Sideview



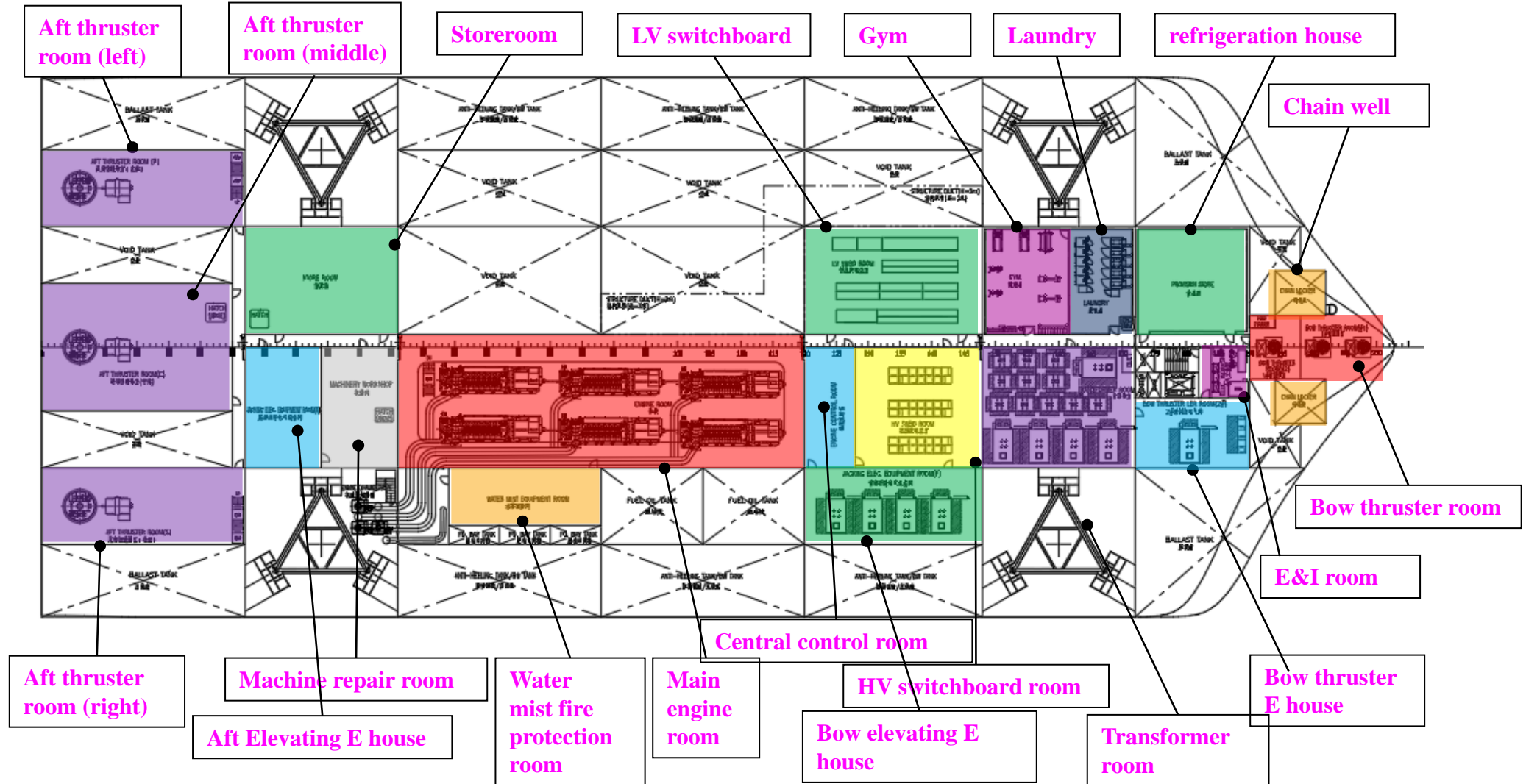
Overall Scheme-General Arrangement

General Arrangement- Main deck



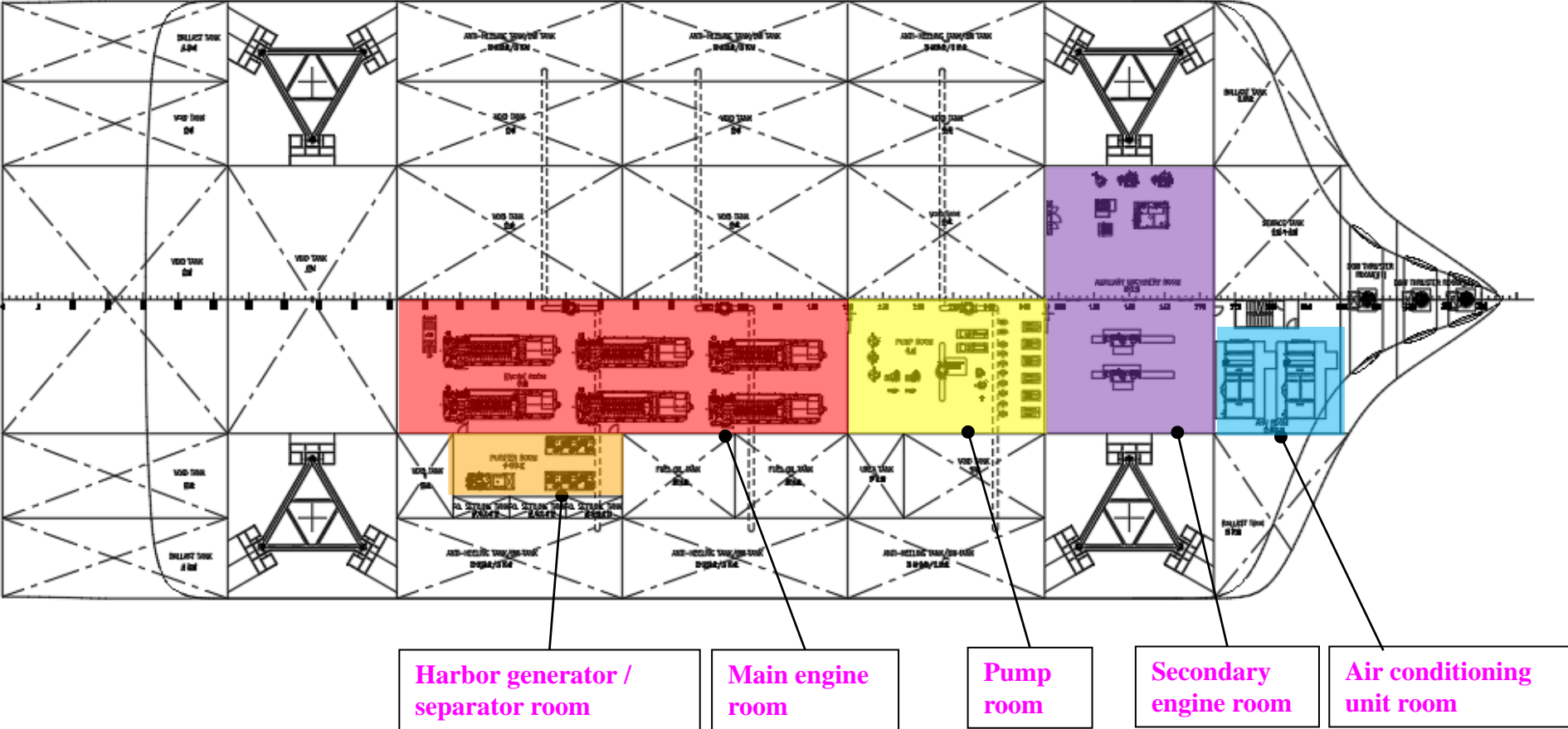
Overall Scheme-General Arrangement

General Arrangement- Tween deck



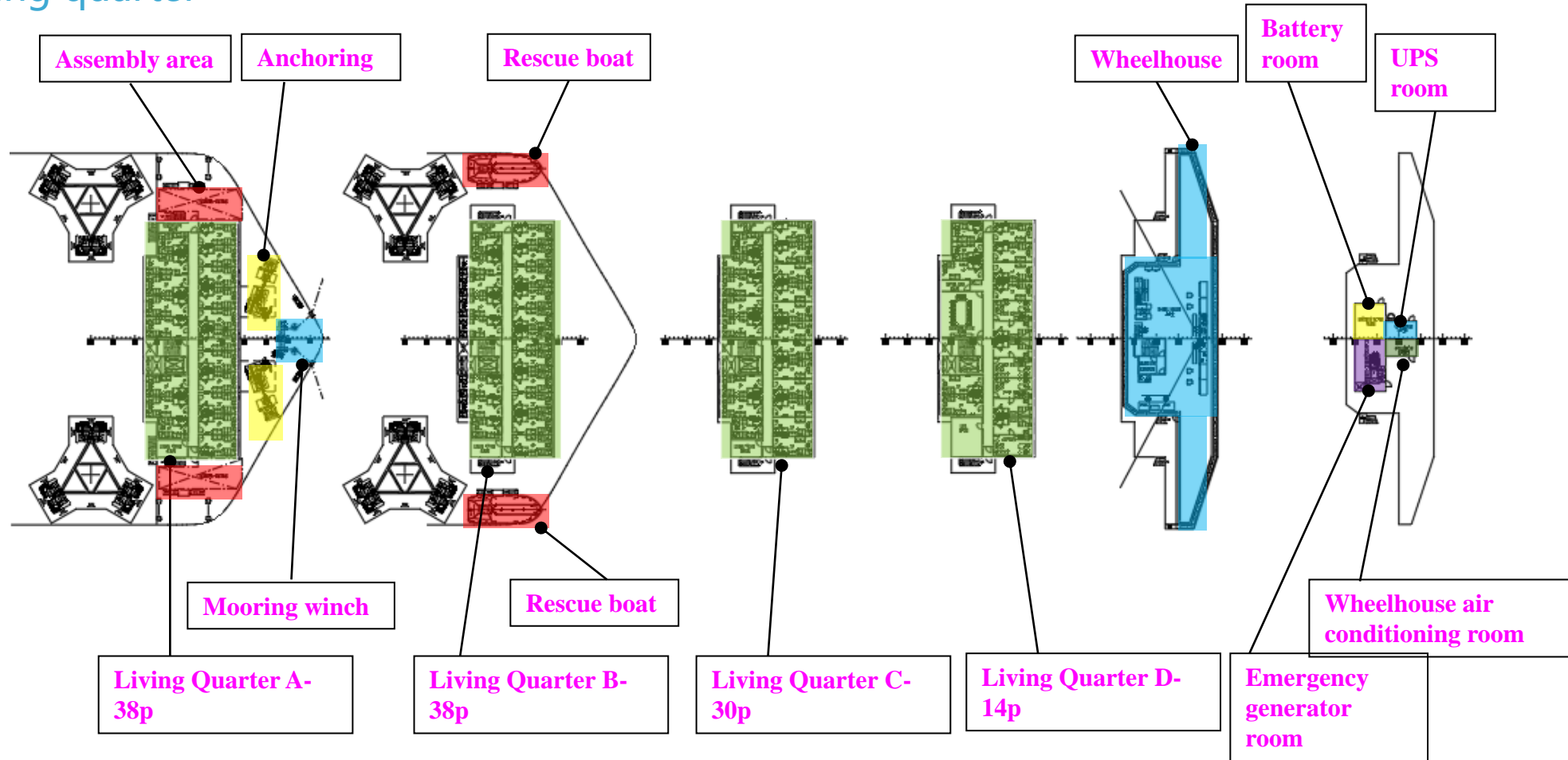
Overall Scheme-General Arrangement

General Arrangement-Underdeck

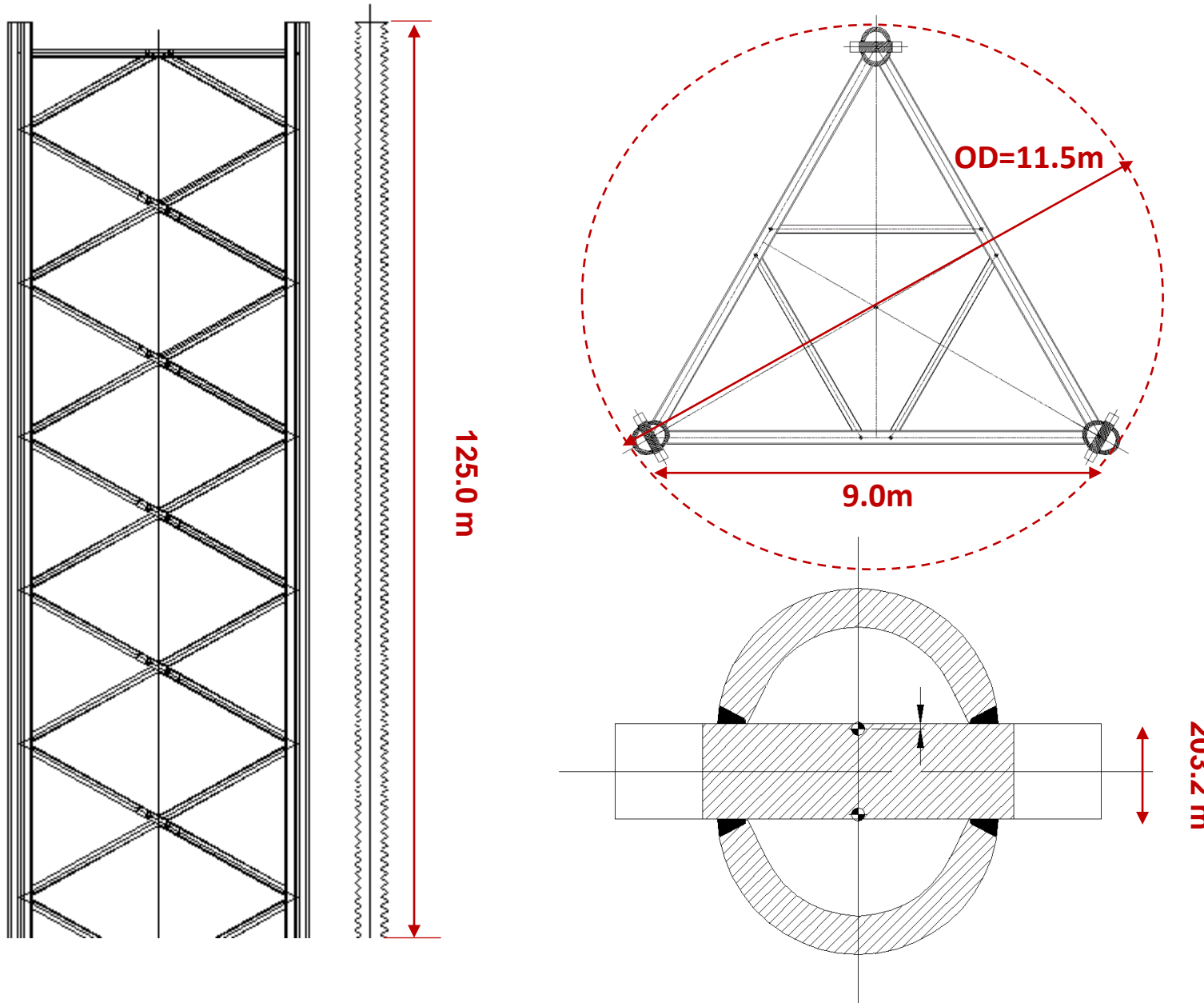


Overall Scheme-General Arrangement

General Arrangement- Living quarter

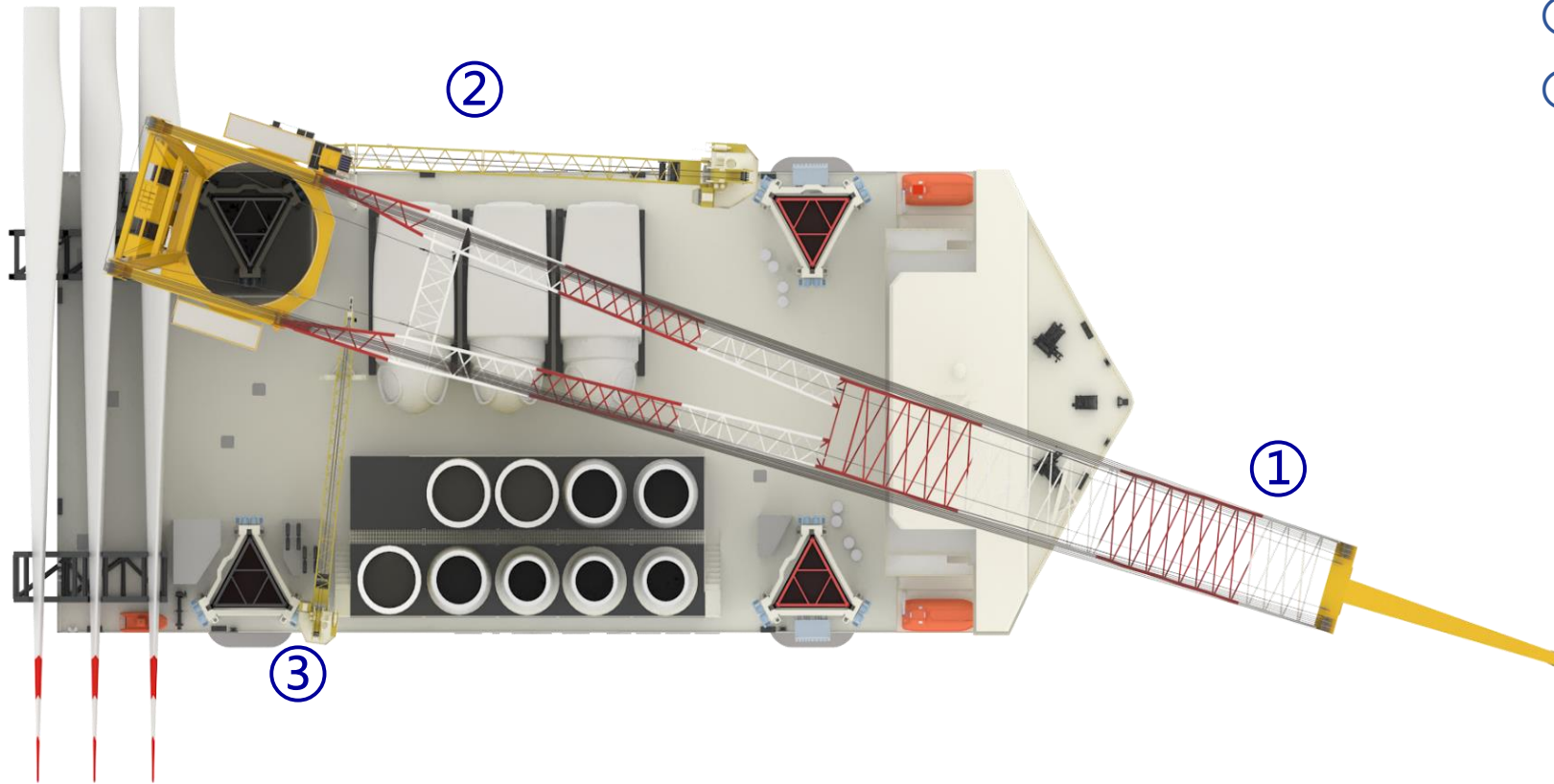


CIMC3060-2200 WTIV Leg Design



- Based on 3,000 times' elevation fatigue life
- After discussion with elevating system supplier, it's decided to use 8 inch rack, the tooth width increases 14%, with a better fatigue and wear resistance; Chord section increases 10%, with more strength and better impact resistance.
- The improved leg section: chord-to-chord 9m, outer ring diameter is 11.5m; can better match with the LEC.

Overall Scheme-Main Deck Arrangement

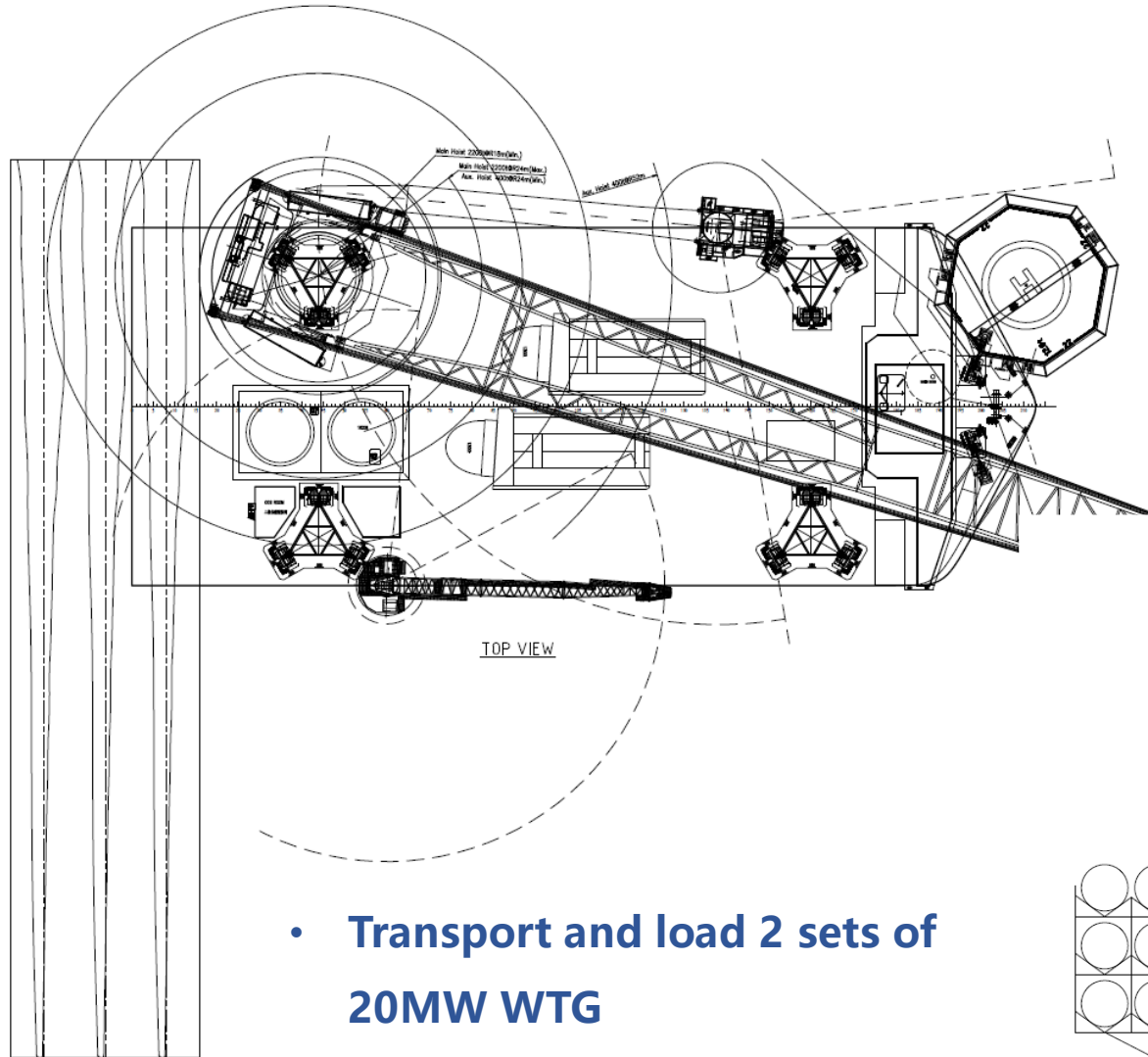


- ① LEC (double hooks): 2,200 tons
- ② Secondary crane: 300 tons
- ③ Supporting crane: 50 tons

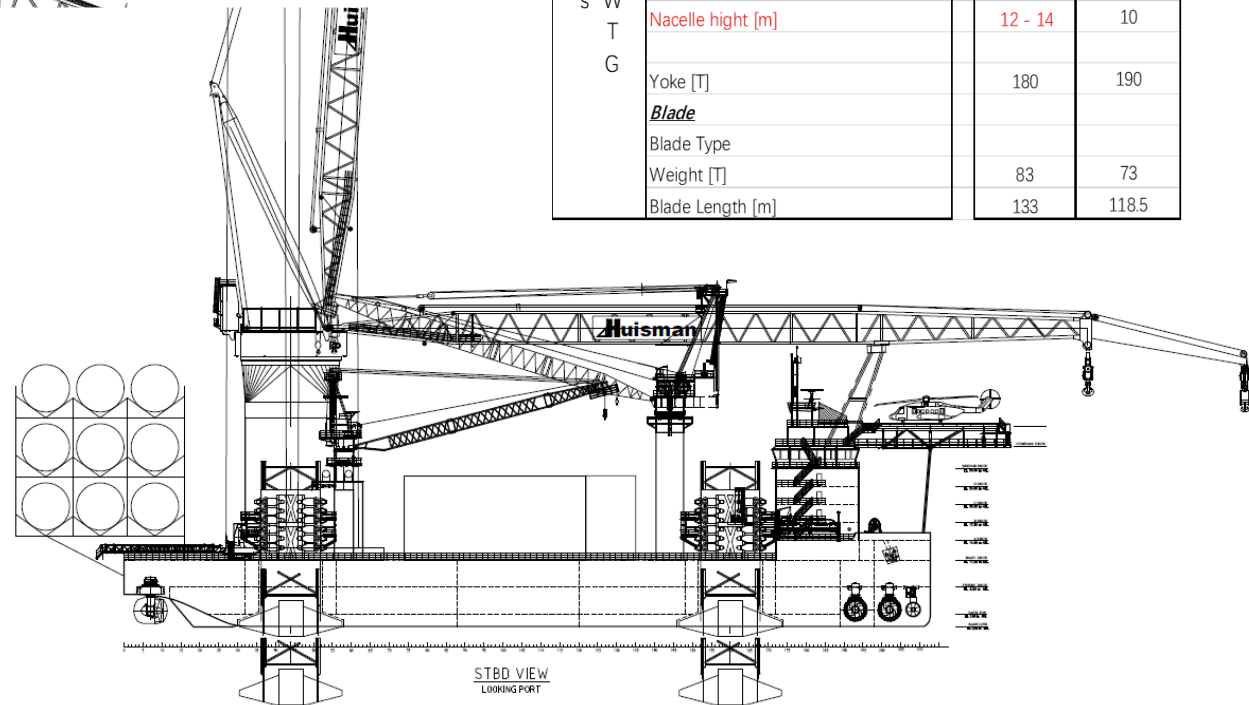
- Deck load: 10-15 t/ m²
- Available deck area: 4,800 m²



Function- Transportation & Installation

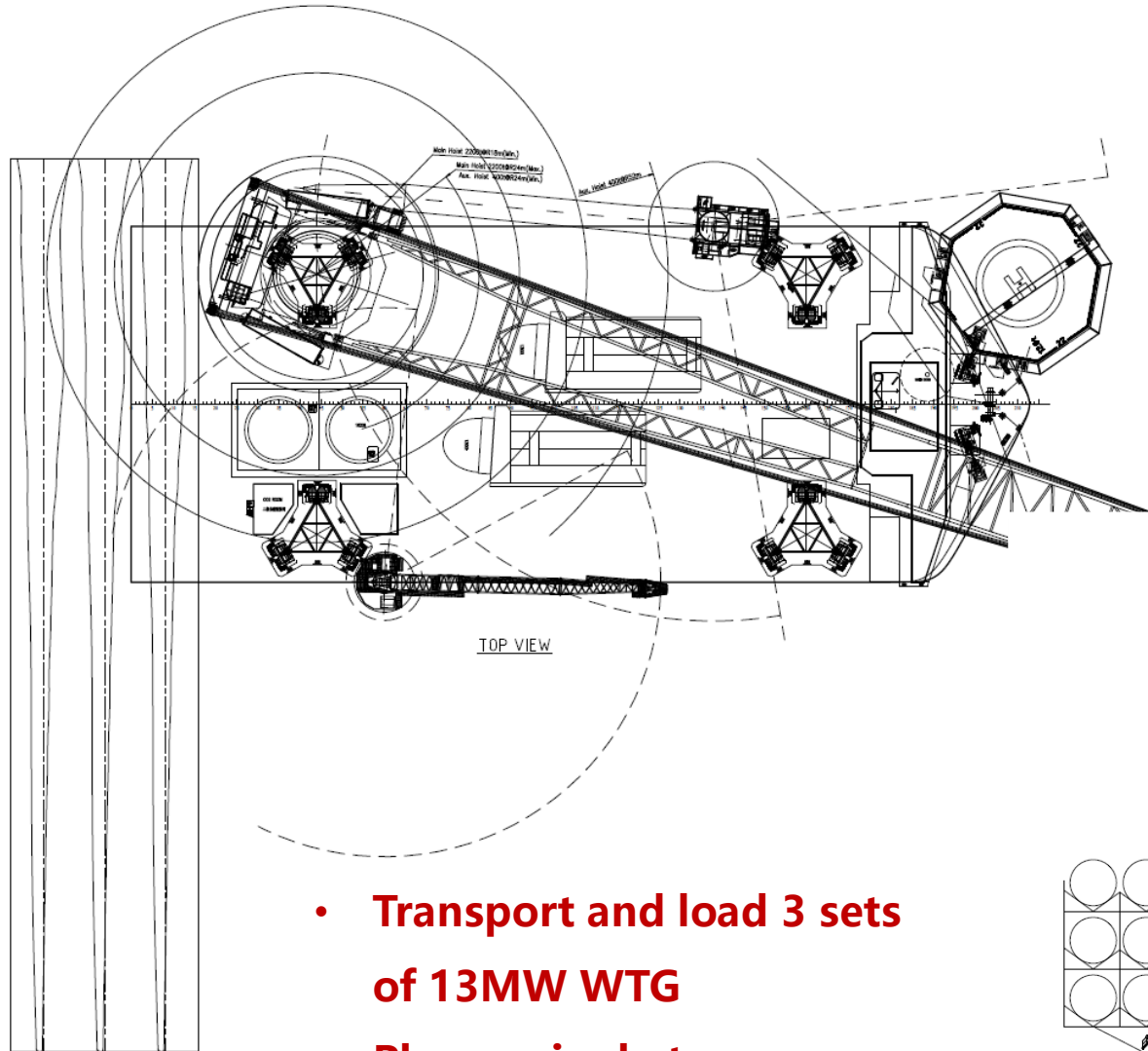


- Transport and load 2 sets of 20MW WTG
- Place a single tower
- Overhang blades

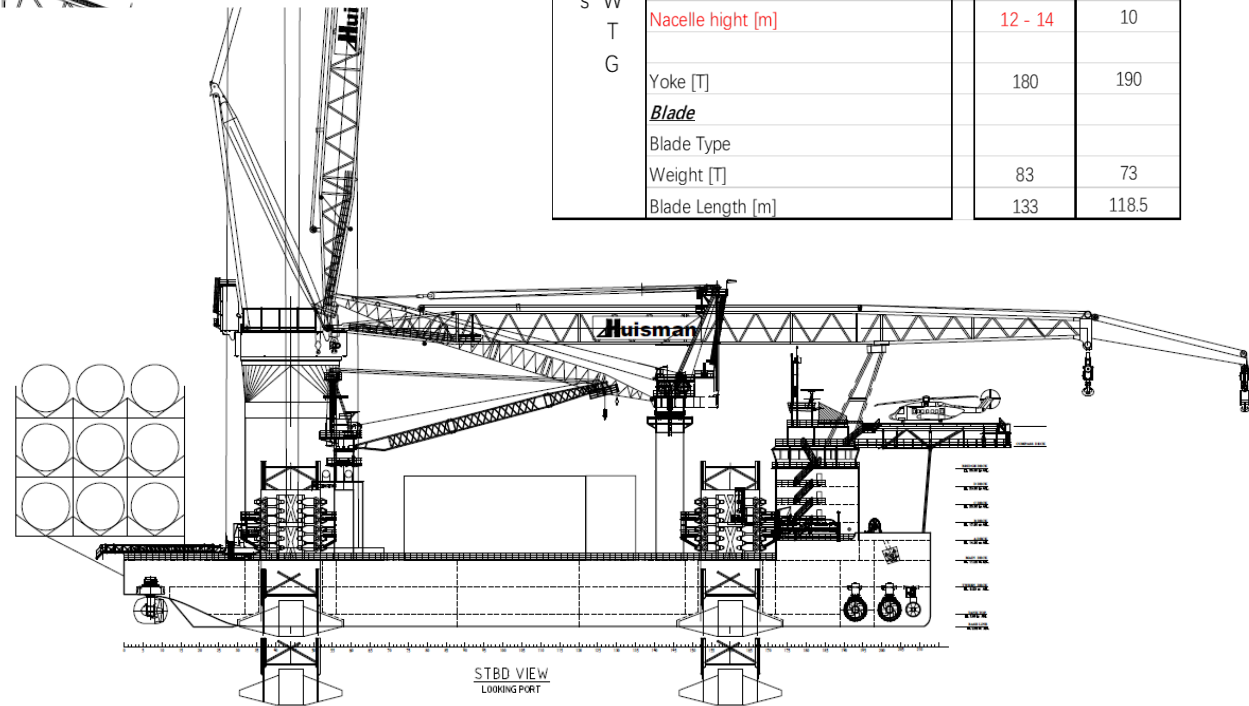


WTG dimensions		2027/28	2024/2025
P r e s s u m i p n t a r i o y s W T G	Rated power	18-20	MySE 16.0
	Rotor diameter [m]	270	242
	Swept Area [m ²]	57,256	
	Tower		
	Min Tower Weight [T]	1450	
	Max Tower Weight [T]	1620	~1000
	Min Tower Length [m]	135	
	Max Tower Length [m]	145	126
	COG		
	Interface Level [mLAT]	22	20-25
Hubheight [m]	157-170	146	
Nacelle			
Nacelle Weight [T] - Min	1200		
Nacelle Weight [T] - Max	1300	600	
Nacelle Length [m]	24 - 30	23	
Nacelle width [m]	12	12.7	
Nacelle height [m]	12 - 14	10	
Yoke [T]	180	190	
Blade			
Blade Type			
Weight [T]	83	73	
Blade Length [m]	133	118.5	

Function- Transportation & Installation

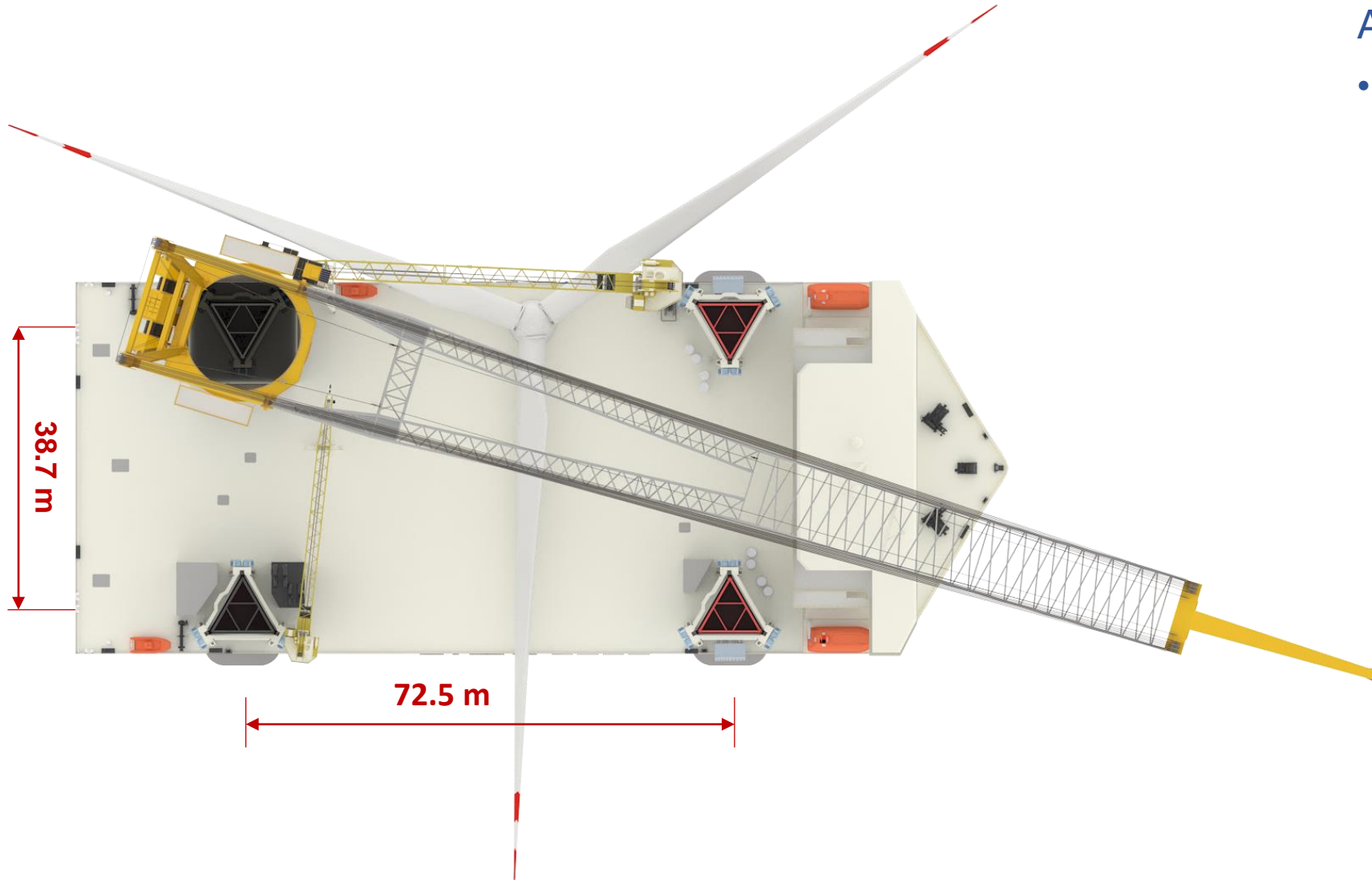


- **Transport and load 3 sets of 13MW WTG**
- **Place a single tower**
- **Overhang blades**



WTG dimensions		2027/28	2024/2025
P r e s s u m i p n t a r i o y n s W T G	Rated power	18-20	MySE 16.0
	Rotor diameter [m]	270	242
	Swept Area [m ²]	57,256	
	<i>Tower</i>		
	Min Tower Weight [T]	1450	
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Yoke [T]	180	190	
<i>Blade</i>			
Blade Type			
Weight [T]	83	73	
Blade Length [m]	133	118.5	

Function- Blade Assembly



Advantage:

- With comparatively bigger molded depth, the sailing becomes more stable; the reserved buoyancy is 10% higher than traditional WTIV; with a better ability of pile extraction; is able to withstand the risk of penetration.

A 3D rendering of an offshore wind farm under construction. In the foreground, a red and white vessel labeled 'CIMC 3060' is positioned around a wind turbine's foundation. A yellow crane is mounted on the vessel, and a large white turbine nacelle is being lowered into place. The turbine's blades are partially visible, with red and white stripes. In the background, a long line of similar wind turbines extends across the horizon over a calm sea under a clear sky.

Vessel Function Introduction

Overall Scheme Introduction

**Model Selection for Major
Equipment**

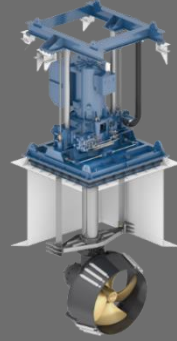
Scheme Comparison

Model Selection for Major Equipment



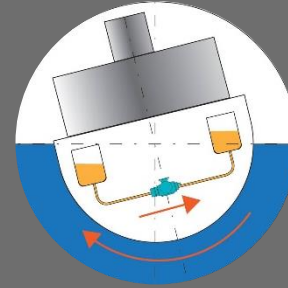
- Equipped with SCR, meet with exhaust level of Tier III
- High efficiency of environmental protection

Propulsion System



- DP2 positioning capability, all thrusters are above basis line of the vessel body, and can work in sheltered waters

Positioning System



- The anti-tilting can rapidly adjust the ballasting water to meet with crane work condition

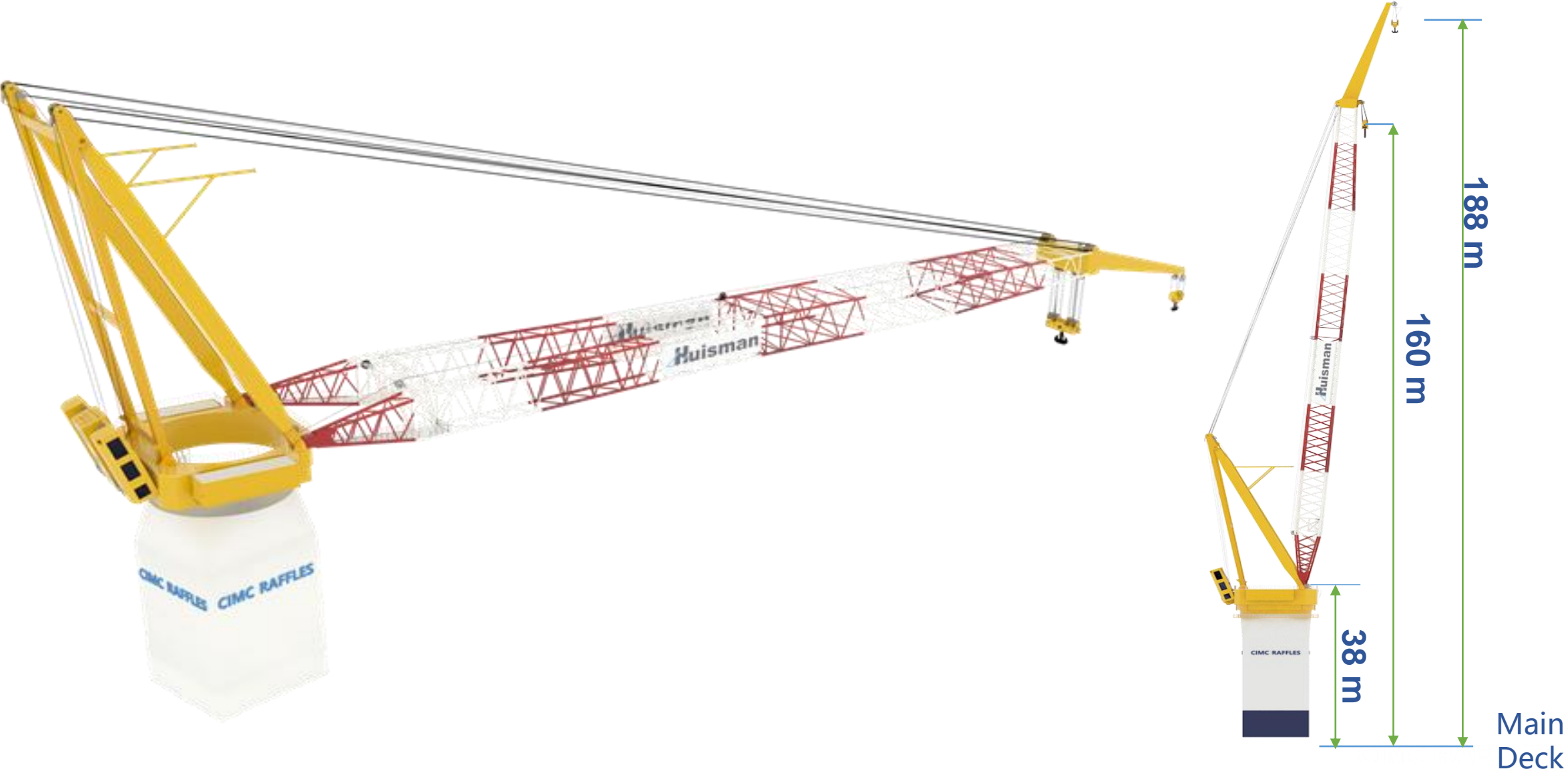
Anti-Tilting System



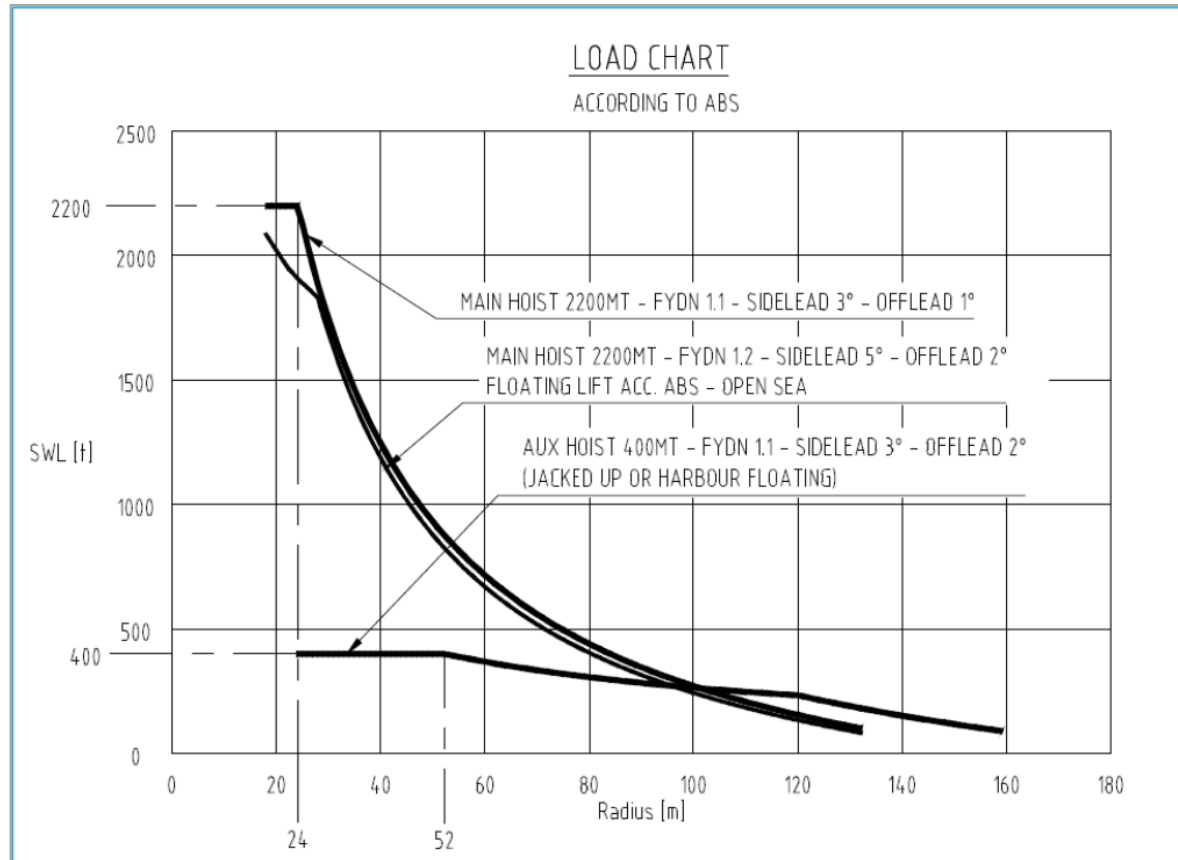
- The busbar operates in closing condition to save energy.
- Lower fuel consumption of 10%
- Safer

Busbar Closing Operation

Primary Crane -1 (Huisman)



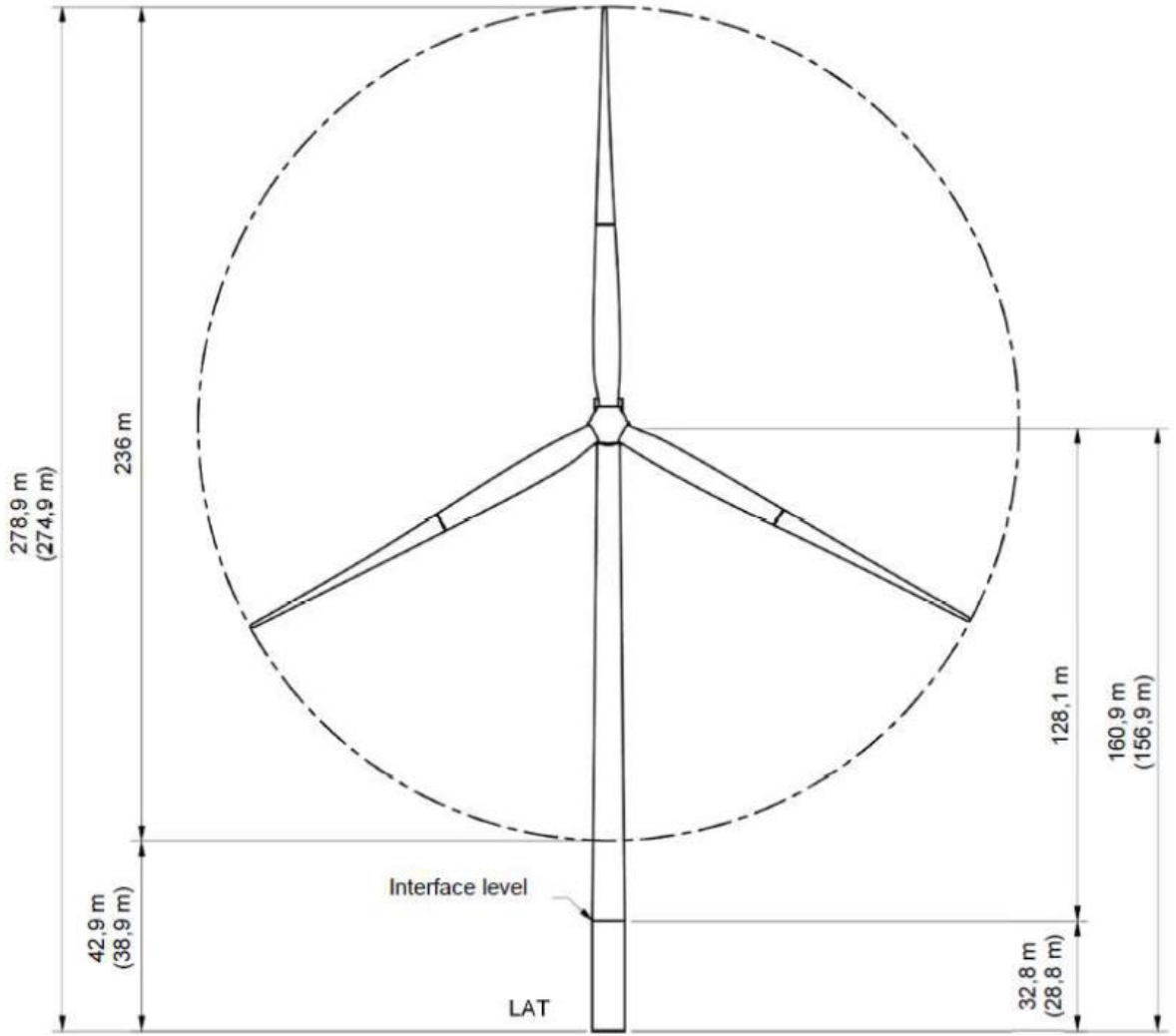
Primary Crane -1 Performance Parameter



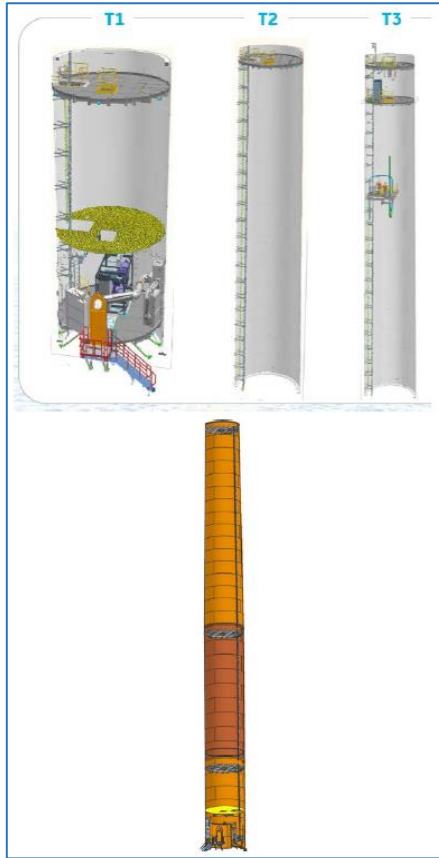
Main Hook	Auxiliary Hook
2,200t@18m~24m 1,250t@40m	400t@24m~52m
Work radius 18m~132.3m	Work radius 24m~159.3m
Lifting speed N-4.5m/min H-13.5m/min	Lifting speed N-3.5m/min H-7m/min
Lifting height Above main deck 160m	Lifting height Above main deck 188m
Weight: 1960 tons	

20MW-270 Lifting Analysis

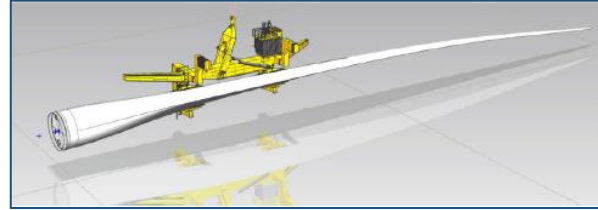
P r e s i s i u m p n t a r i o n s W T G	WTG dimensions	2024/2025	2027/28	2024/2025
	Rated power	14-16	18-20	MySE 16.0
	Rotor diameter [m]	240	270	242
	Swept Area [m ²]	45,239	57,256	
	<i>Tower</i>			
	Min Tower Weight [T]	725	1450	
	Max Tower Weight [T]	1200	1620	~1000
	Min Tower Length [m]	119	135	
	Max Tower Length [m]	126	145	126
	COG			
	Interface Level [mLAT]	19	22	20-25
	Hubheight [m]	138-145	157-170	146
	<i>Nacelle</i>			
	Nacelle Weight [T] - Min	500	1200	
	Nacelle Weight [T] - Max	760	1300	600
	Nacelle Length [m]	24 - 30	24 - 30	23
	Nacelle width [m]	12	12	12.7
	Nacelle hight [m]	12 - 14	12 - 14	10
	Yoke [T]	180	180	190
	<i>Blade</i>			
Blade Type				
Weight [T]	61	83	73	
Blade Length [m]	115	133	118.5	



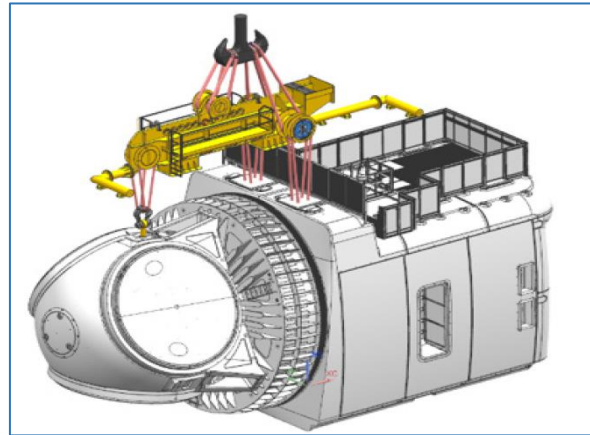
MySE 16.0-242 Lifting Analysis



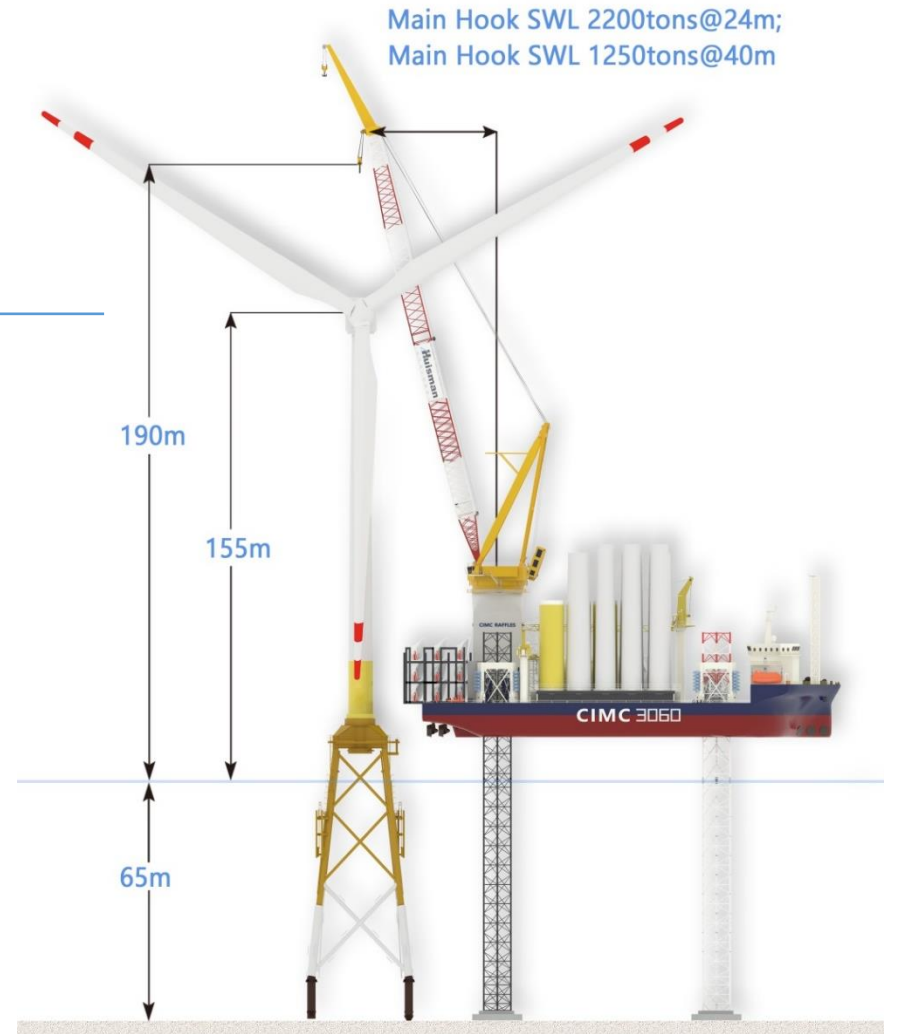
Above sea level 146m
<1000tons



118.5m/73tons



23mX10mX12.7m
190t+600t=790t

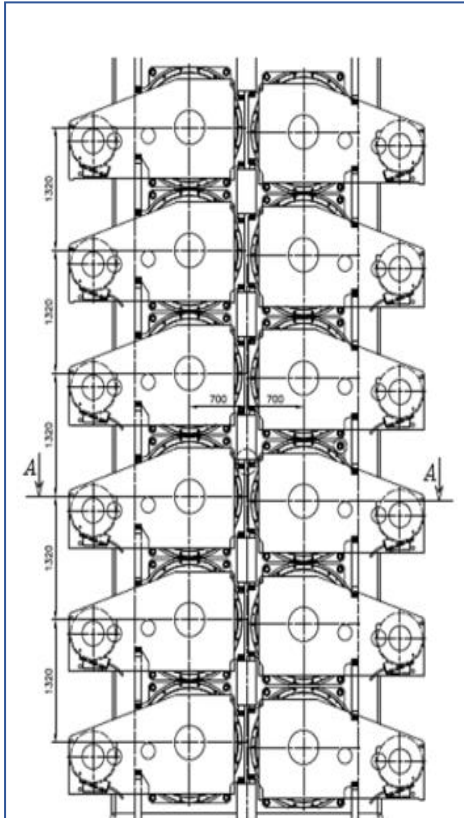
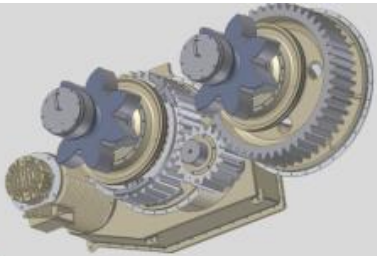


Boqiang 3060-2200 can lift and install WTG of GE12MW, MySE 16.0 MW

Elevating System

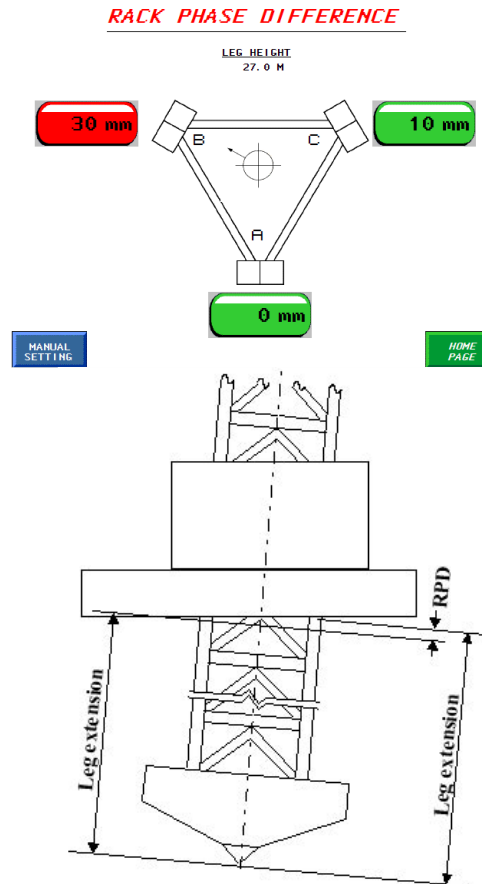
Elevating Configuration and Capacity

Elevating capacity of single leg	9,360t
Supporting capacity of single leg	21,600t
Elevating speed	0.5/0.8m/min
Elevating times	3000 times



RPD Leg Penetration Indication

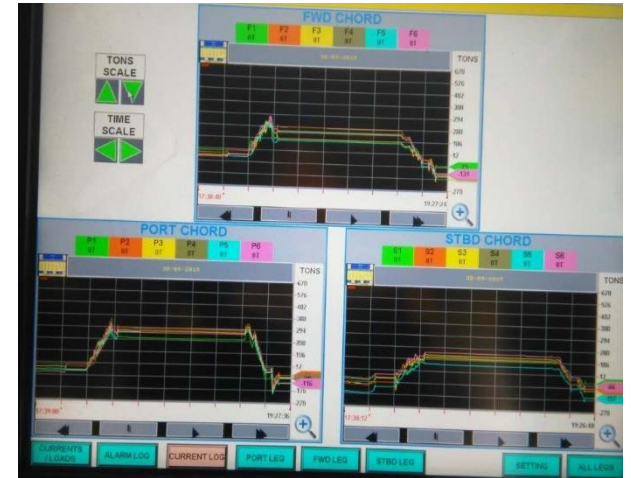
- Real-time indication
- Avoid damage



Static Load Indication System

Retorque redistribution indication

- Real-time indication
- Remote control
- Can transfer with load



Elevating System Life

Life Calculation-Load List

The quantity of carried WTG sets	Empty Vessel Weight	Variable Load	Leg Quantity	Single Leg Load (not consider frictional loss)	Elevating Time	Air Gar (m)
3(full)	24,100	9000	4	8275	750	10
2	24,100	7200	4	7775	750	10
1	24,100	5400	4	7275	750	10
0	24,100	3600	4	6775	750	10

Model Selection for Major Equipment - Electrical Load Calculation

航行工况 Sailing		进出港工况 Maneuvering		升平台工况 Jacking		立柱起吊工况 Crane Operation		DP完整工况 (插 桩) MAX DP Entire (leg lowering) MAX		DP完整工况 (插 桩) NORMAL DP Entire (leg lowering) NORMAL		DP故障工况 (B组失 效) DP Failure Mode		停泊工况 Harbor Mode		应急工况 Emergency Mode			
DF	kW	DF	kW	DF	kW	DF	kW	DF	kW	DF	kW	DF	kW	DF	kW	DF	kW	DF	kW
0.9	3281	0.2	729	0.00	0	0.0	0	0.72	2625	0.37	1349	0.58	2115						
0.0	0	0.5	1115	0.00	0	0.0	0	0.78	1739	0.35	780	0.67	1494						
0.0	0	0.0	0	1.00	1409	0.0	0	0.4	549	0.4	549	0.0	0						
0.0	0	0.0	0	0.00	0	0.8	938	0.0	0	0.0	0	0.0	0						
	581		728		485		671		749		733		693						
0.9	3281	0.2	729	0.00	0	0.0	0	0.72	2625	0.37	1349	0.0	0						
0.0	0	0.0	0	0.00	0	0.0	0	0.78	1739	0.35	780	0.0	0						
0.0	0	0.0	0	1.00	1409	0.0	0	0.4	549	0.4	549	0.0	0						
0.0	0	0.0	0	1.00	1409	0.0	0	0.4	549	0.4	549	0.0	0						
	1193		1492		984		1822		1380		1380		0						
0.9	3281	0.0	0	0.00	0	0.0	0	0.72	2625	0.37	1349	0.58	2115						
0.0	0	0.0	0	0.00	0	0.0	0	0.15	138	0.35	321	0.51	468						
0.0	0	0.0	0	1.00	1409	0.0	0	0.4	549	0.4	549	0.0	0						
0.0	0	0.0	0	0.00	0	0.8	938	0.0	0	0.0	0	0.0	0						
	1383		1559		1250		1784		1686		1686		1212						
	13001		6352		8353		6152		17502		11924		4301		605		309		
	13403		6549		8612		6342		18044		12293		4434		637		326		
2735	4145	2735	4145	2735	4145	2735	4145	2735	4145	2735	4145	2735	4145		800		500		
0	4	0	2	1	2	0	2	2	4	0	4	1	1		1		1		
	16580		8290		11025		8290		22050		16580		6880		800		500		
	81%		79%		78%		77%		82%		74%		64%		80%		65%		

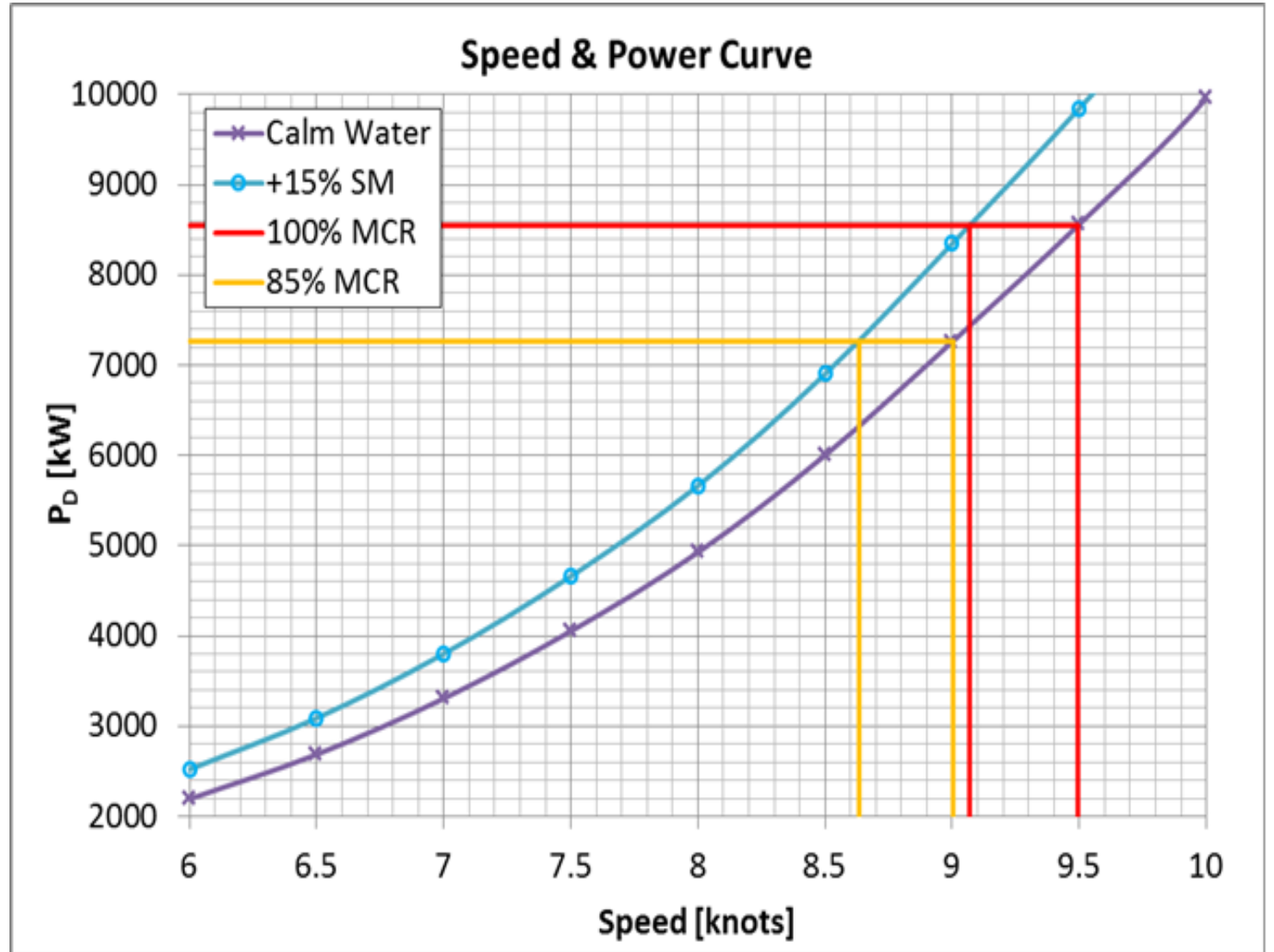
Main Engine: 6X3380eKw, SCR Tier III
 Berth Engine: 1X800ekw
 Emergency Engine: 1X500ekw

Model Selection for Major Equipment - Thruster

E-Thruster system:

Aft thruster: 3*3500kW full
circle swing

Bow thruster: 3*1660kW



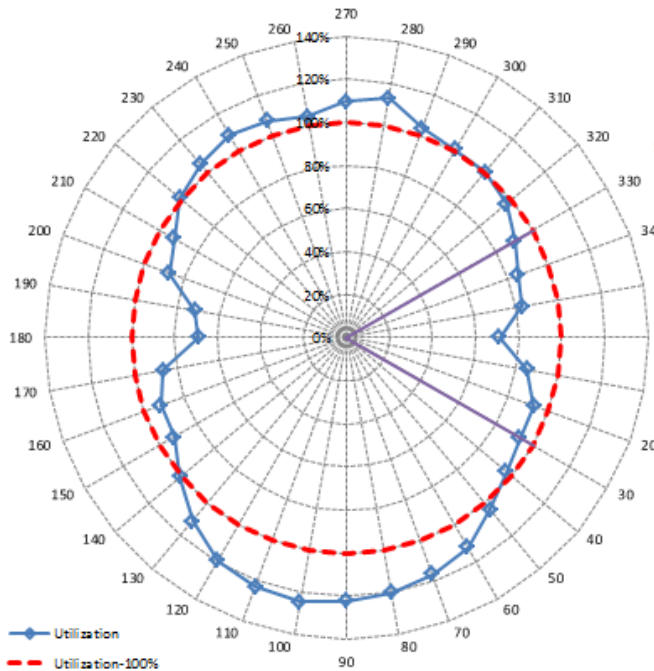
The selected thruster configuration is based on speed calculation:
speed ≥ 9 kn, can meet with ordinary sailing

DP Dynamic Positioning Analysis

Dynamic Positioning Analysis: the calculation meets with bow direction $\pm 30^\circ$ positioning capacity below is the calculation for T0 thruster in complete working condition

CIMC RAFFLES

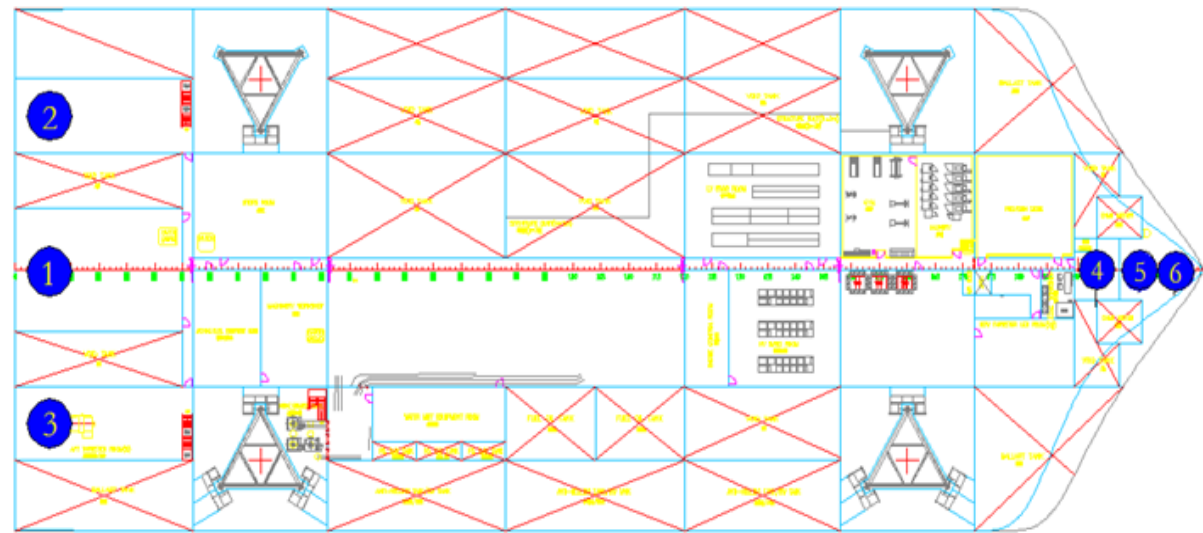
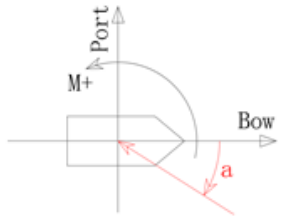
DP Capability Plot



Project: CIMC2200
 Load Condition: ZhTXFDP1
 Current Velocity: 1.00 m/s
 Wind Speed: 13.80 m/s
 Significant wave height: 2.5 m
 Peak period: 5.7 s
 Failure Mode: Thruster Intact
 Case Abbreviation: T0

Thru [No.]	x_coor [m]	y_coor [m]	F_Eff [t]	F_Max [t]
Th1	-62.95	0.00	46.33	54.50
Th2	-58.39	-17.17	46.33	54.50
Th3	-58.39	17.17	46.33	54.50
Th4	53.64	0.00	20.91	24.60
Th5	58.19	0.00	20.91	24.60
Th6	62.74	0.00	20.91	24.60

Max. Utilization: 93% 124%
 Min. Utilization: 71% 69%



Thruster allocation diagram

Rose diagram of DP capability of T0 thruster in complete working condition

A 3D rendering of an offshore wind farm under construction. In the foreground, a red and white supply vessel named 'CIMC 3060' is positioned around a wind turbine's foundation. A yellow crane is mounted on the vessel, and a large white turbine nacelle is being lowered into place. The turbine's three blades, with red and white stripes, extend outwards. In the background, a long line of similar wind turbines stretches across the horizon over a calm sea under a clear sky.

Vessel Function Introduction

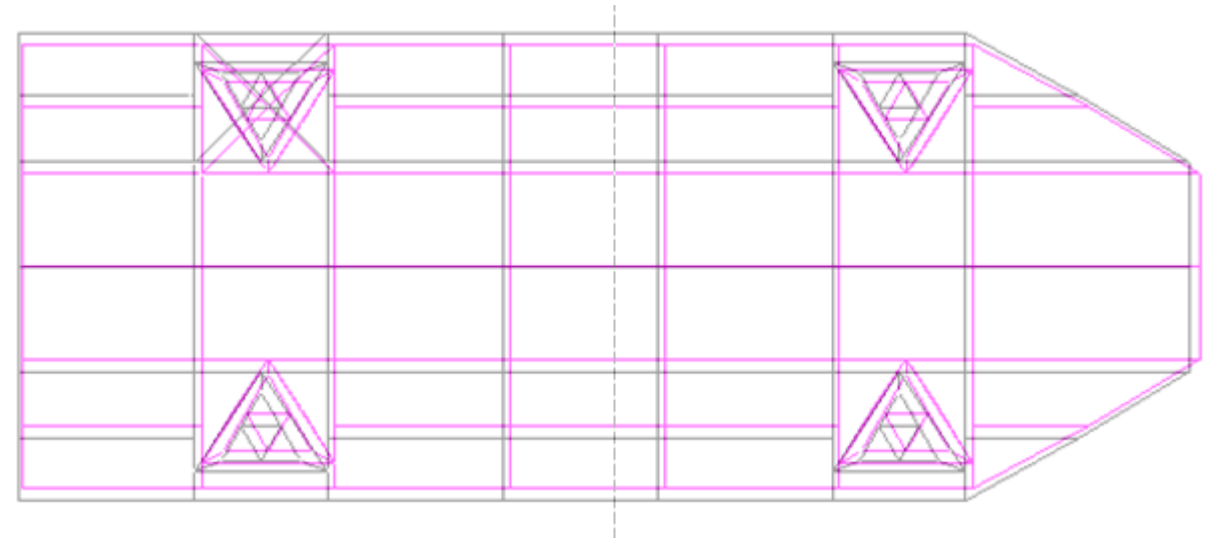
Overall Scheme Introduction

Model Selection for Major Equipment

Scheme Comparison

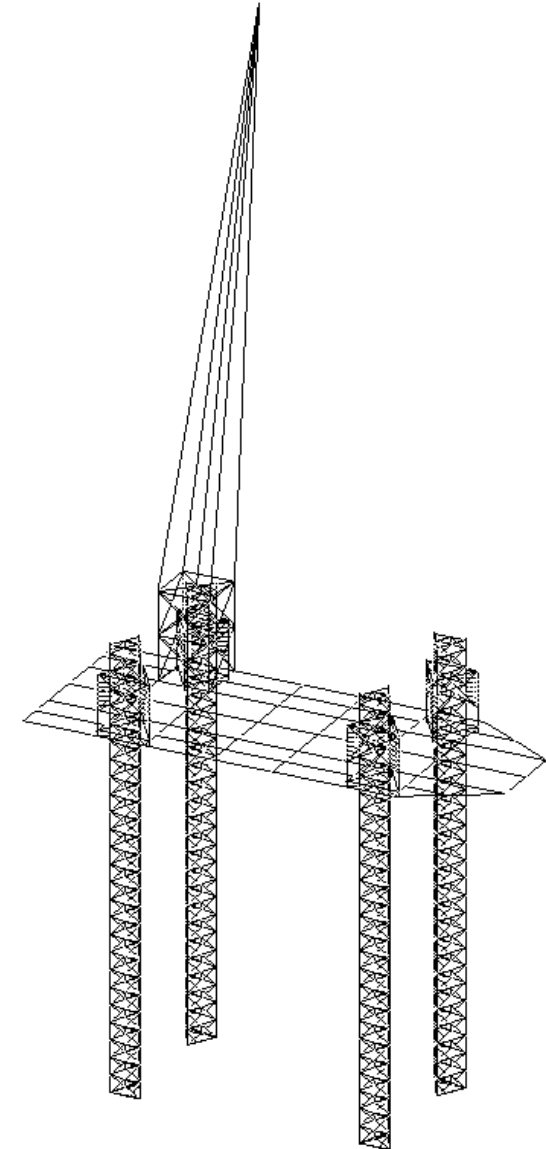
Vessel Dimension Comparison

Dimension	Boqiang 3060	Some Vessel
Deck length m	133	133.8
Deck width m	53	50
Depth m	11	11
Longitudinal distance between legs m	72.5	72
Horizontal distance between legs m	38.7	35.8
Total length of leg m	130	130
Leg chord distance m	9	10
Steel consumption m	17629	17901



Jack-up – Comparison of Lifting and Installation work condition

Work condition	Boqiang 3060	Some Vessel
Variable load ton	6500	6500
Lifting weight ton	1800t @ 36.5m / 2500t @ 30m	1800t @ 36.5m / 2500t @ 30m
Max. water depth m	70	70.00
Penetration m	20.00	20.00
Air gap m	9.00	9.00
Wind speed m/s	20.00 (upper limit of Moderate gale)	13.8 (centre line of Strong breeze)
Hmax m	7.44 (Hs=4m)	7.44
Wave period s	9.00	9.00
Surface velocity m/s	1.03	1.03
Surface velocity m/s	1.03	0
Advice:	Regarding the lifting work condition, it's suggested to take into consideration the once per year 1.03 uniform velocity in northern South Sea; Hs≤4m to cover 85% waves of the northern South Sea	

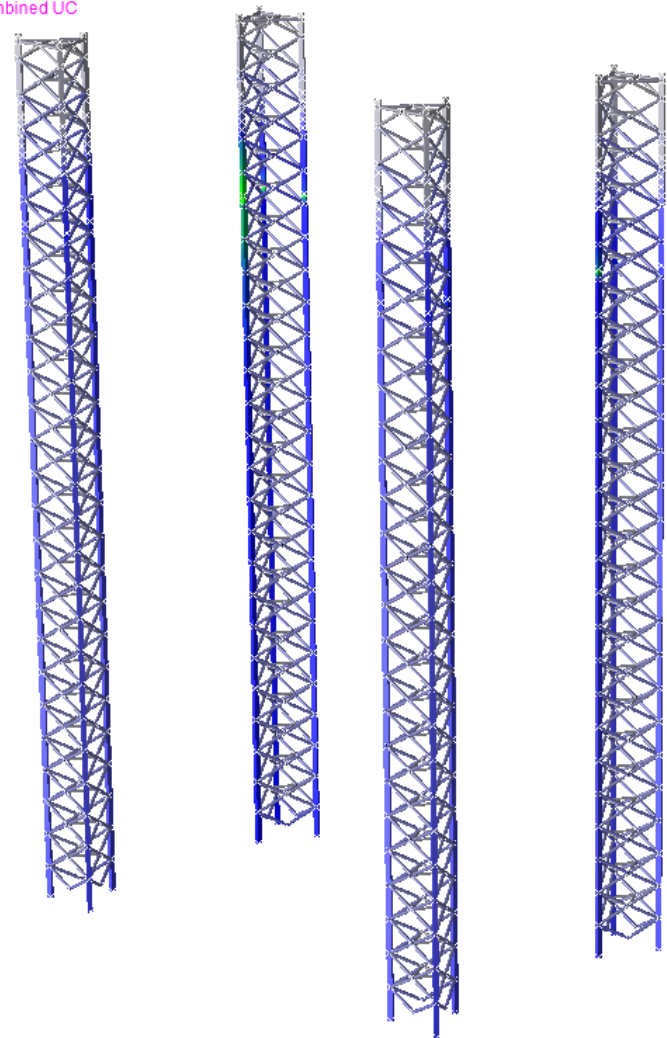


Jack-up – Comparison of Lifting and Installation work condition

For All Active LCs
Mem Result: Combined UC



Boqiang 3060

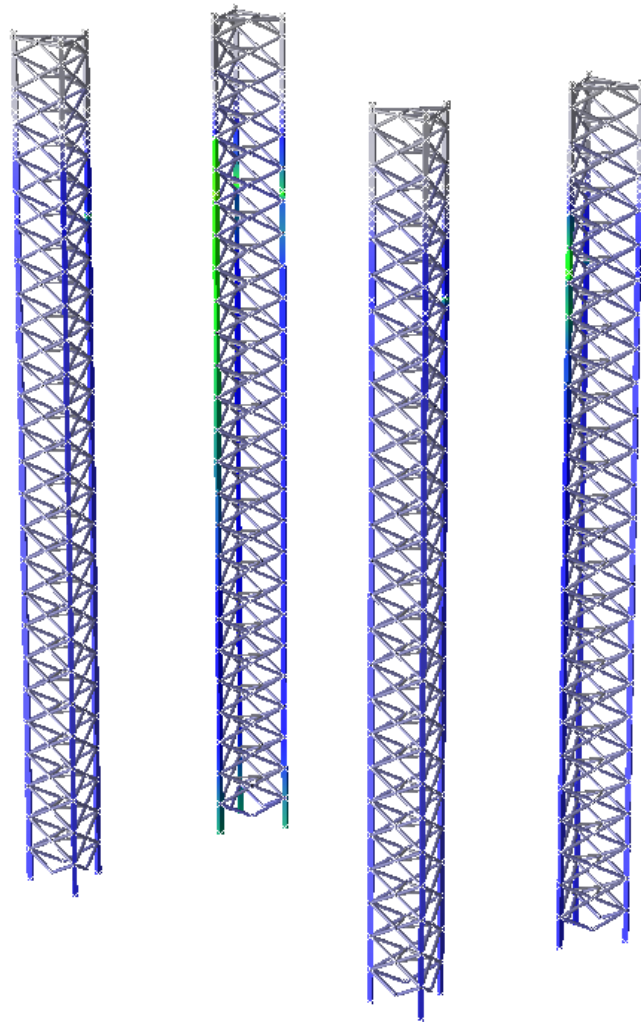


Leg strength max. use ratio=59%

For All Active LCs
Mem Result: Combined UC



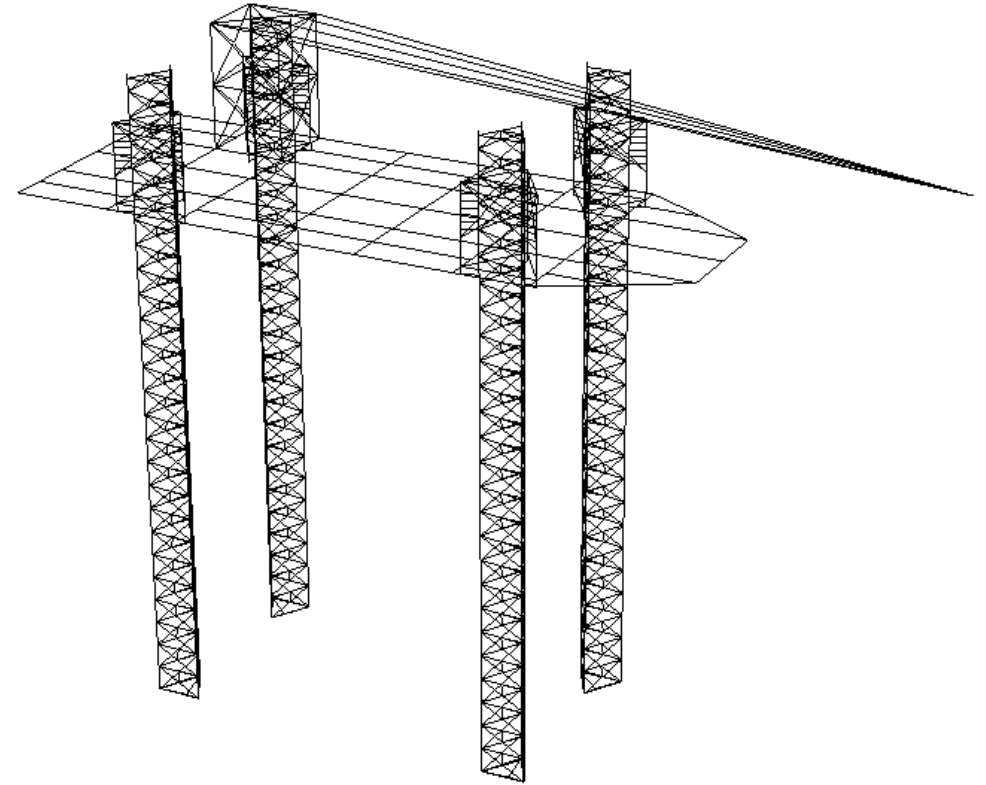
Some Vessel



Leg strength max. use ratio= 75%

Jack-up – Comparison of Non Lifting and Installation work condition

Work condition	Boqiang 3060	Some Vessel
Variable load ton	6500	6500
Lifting weight ton	-	-
Max. water depth m	70	70.00
Penetration m	20.00	20.00
Air gap m	10	10
Wind speed m/s	36	36
Hmax m	8.37 (Hs=4.5m)	8
Wave period s	9.00	9.00
Surface velocity m/s	1.03	1.542
Surface velocity m/s	1.03	0
Advice:	Regarding the non lifting work condition, it' s suggested to take into consideration the once per year 1.03 uniform velocity in northern South Sea; Hs≤4.5m to cover 90% waves of the northern South Sea	

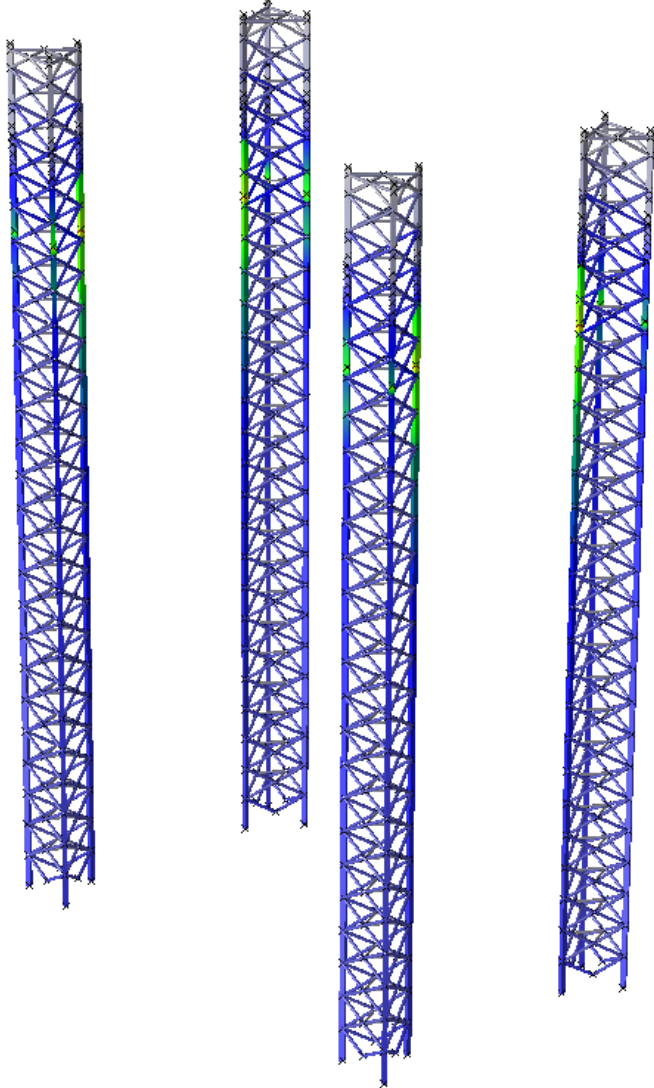


Jack-up – Comparison of Non Lifting and Installation work condition

For All Active LCs
Mem Result: Combined UC

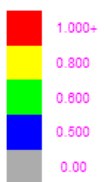


Boqiang 3060

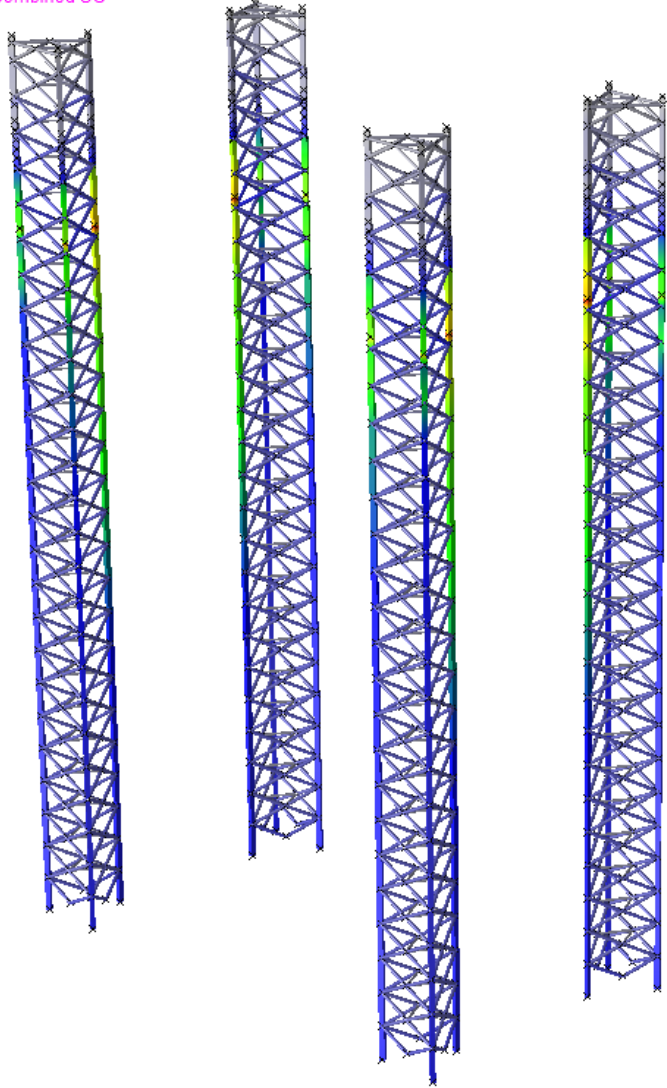


Leg strength max. use ratio= 90%

For All Active LCs
Mem Result: Combined UC



Some Vessel



Leg strength max. use ratio= 99%

Jack-up – Comparison of Survival Condition

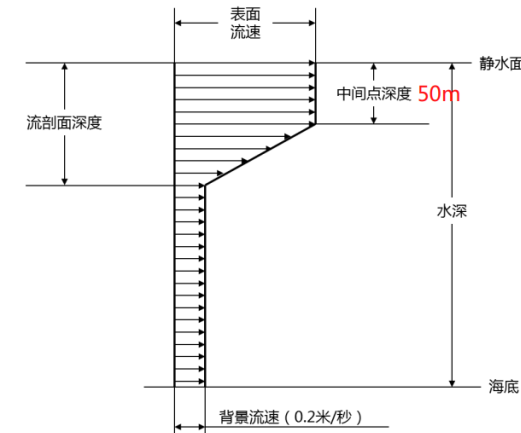
Work condition	Boqiang 3060	Some Vessel
Variable load ton	2000	2000
Lifting weight ton	-	-
Max. water depth m	50	50
Penetration m	10	10
Air gap m	12	12
Wind speed m/s	51.5	51.5
Hmax m	16.3	17
Wave period s	11.4	12
Surface velocity m/s	1.37	1.542
Surface velocity m/s	1.37	0
Advice:	Regarding the survival work condition, it's suggested to take into consideration the once in a century sudden typhoon in the South Sea; wave height is 17m, uniform velocity is 1.37.	

突发台风条件下的风、浪、流、天文潮及风暴潮极值

(北纬17°以北、东经118°以西)

表A.2.2.2.2

	重现期 (年)			
	100	200	1000	2000
风速 (10 米高程处)				
1 小时平均风速 (米/秒)	27.4	29.0	32.6	34.1
10 分钟平均风速 (米/秒)	28.5	30.2	33.9	35.5
1 分钟平均风速 (米/秒)	31.3	33.2	37.3	39.0
3 秒钟阵风风速 (米/秒)	38.0	40.3	45.3	47.3
波浪 (水深大于 150 米)				
有义波高 H_s (米)	9.2	9.9	11.7	12.4
最大波高 H_{max} (米)	16.3	17.7	20.8	22.1
最大波峰高 C_{max} (米)	10.4	11.3	13.3	14.2
谱峰周期 T_p (秒)	12.6	12.9	13.6	13.9
最大波周期 T_{Hmax} (秒)	11.4	11.7	12.3	12.5
海流 (20 米至 50 米水深)				
均一流速 (米/秒)	1.37	1.45	1.63	1.70



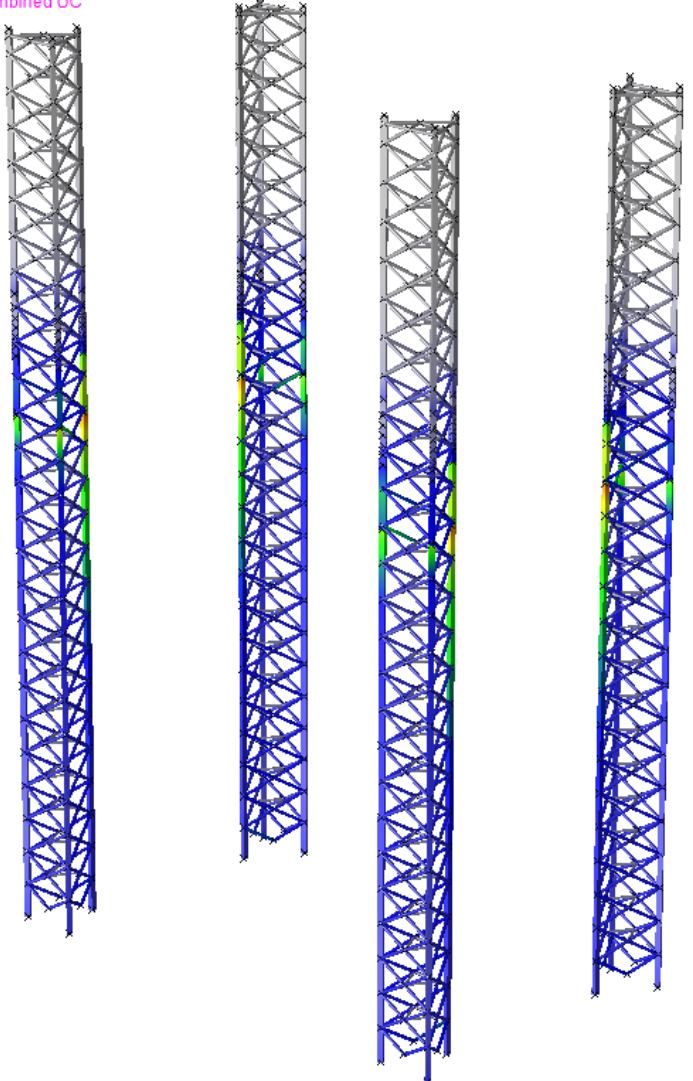
图A.2.2.1.4 台风条件下的流速剖面 (水深大于50米)

Jack-up – Comparison of Survival Condition

For All Active LCs
Mem Result: Combined UC



Boqiang 3060

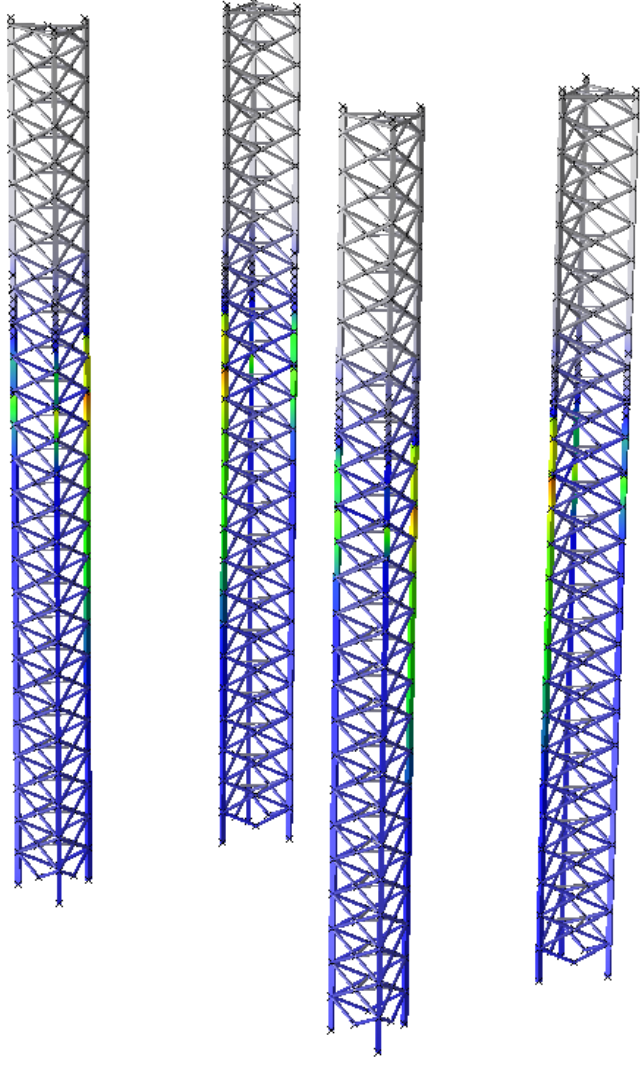


Leg strength max. use ratio= 91%

For All Active LCs
Mem Result: Combined UC



Some Vessel



Leg strength max. use ratio= 91%

Rack Comparison

Item	NG14000XL	JDN-3000	Boqiang 3060	Some Vessel
Work water depth m	65	60	70	70
Length m	142	169.3	133	133
Width m	50	60	53	53
Depth m	11	14.6	11	11
Leg chord distance m	8	12.6	9	9
Variable load	8500	14000	6500	6500
Single tooth elevating load	350	284	265	260
Piles of gearbox	4	8	6	6
Elevating times per year	150	100	100	100
Operation year	20	25	25	25
Single tooth load times	24000	40000	30000	30000
Rack thickness inch	8.27	9.84	8	7
Rack stress t/in	42	29	33	37
Rack stress x load times	1.02E+06	1.15E+06	9.94E+05	1.11E+06

Comparison item	7 inch rack	8 inch rack	remark
Rack thickness	177.8	203.2	Rack stress reduces 14.3%
Chord section	244119	263922	Anti stress ability increases 8.1%
Chord torque	8.50E+09	1.02E+10	Anti bending increases 20%



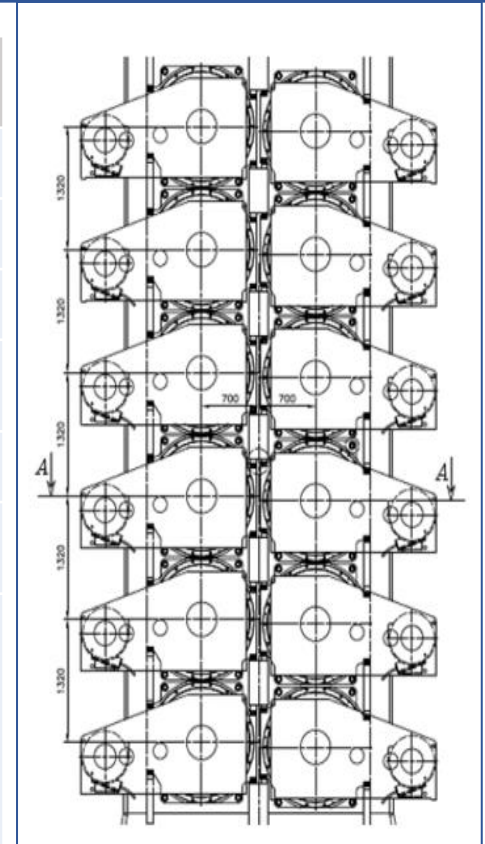
8 inch rack pressure and load times meet with major international design level

8 inch rack advantage: stress/load decreases, reduce gluing or wear; the bending stress of tooth root as well as shearing strength decreases; while fatigue life increases.

8 inch rack disadvantage: cost increases 20-30 million RMB.

Elevating System Comparison

	Lifting and installation work condition		Non lifting and installation work condition		Survival condition	
	Boqiang 3060	Some Vessel	Boqiang 3060	Some Vessel	Boqiang 3060	Some Vessel
Operation cycle (s)	10.66	9.96	10.66	9.96	7.01	6.47
Leg strength	0.59	0.75	0.9	0.99	0.90	0.91
Single leg supporting load ton	12112	12612	9735	10159	9917	9858
Single tooth load ton	580	739	692	877	746	890
Single led chord load ton	5425	5696	6398	6616	6725	6511
Advice	Lifting and installation work condition decides the pre ballasting load of elevating system, pre ballasting load of a single leg is around 12,000 tons		The survival condition decides the supporting load of elevating system, the figure marked in red shows it excesses single tooth supporting load.			



	Boqiang 3060	Some Vessel
额定升降	265	260
最大升降	390	375
静态支持	575	508
风暴支持	750	680

In domestic, the WTIV is supposed to avoid typhoon, so it's not suggested to design the survival condition as control work condition and can be adjusted according to actual needs.

A 3D rendering of an offshore wind farm under construction. In the foreground, a red and white supply vessel named 'CIMC 3060' is positioned around a wind turbine's foundation. A yellow crane is mounted on the vessel, and a large white nacelle is being lowered into place. The turbine's tower is partially visible, and its three blades, with red and white tips, extend outwards. In the background, a long line of similar wind turbines stretches across the horizon over a calm sea under a clear sky.

Vessel Function Introduction

Overall Scheme Introduction

Model Selection for Major Equipment

Scheme Comparison



Thank you